

# **Exhibit B**

UNITED STATES DISTRICT COURT  
FOR THE SOUTHERN DISTRICT OF FLORIDA

IN RE: ERMI LLC  
(‘289) PATENT LITIGATION

Case No. 0:19-MD-02914-RKA

**COMPLAINT FOR DECLARATORY  
JUDGMENT AND OTHER  
AFFIRMATIVE CLAIMS**

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**COMPLAINT FOR DECLARATORY JUDGMENT AND AFFIRMATIVE  
CLAIMS AGAINST EMRI LLC, END RANGE OF MOTION  
IMPROVEMENT, INC. AND THOMAS BRANCH**

OneDirect Health Network, Inc., on its own behalf and on behalf of all of its distributors who have been or may be sued by ERMI, LLC, make and file this complaint for declaratory judgement against ERMI, LLC. In addition, OneDirect Health Network, Inc., on its own behalf, as well as Team Post Op, Inc. make and file their claims for affirmative relief against EMRI, LLC, Thomas P. Branch, and End Range of Motion Improvement, Inc., and allege as follows:

**THE PARTIES**

1. OneDirect Health Network, Inc. (“OneDirect”) is a Georgia Domestic Profit Corporation with a place of business located at 2964 Peachtree Rd., Suite 400, Atlanta, Georgia 30305.

2. Team Post Op (“TPO”) is a Florida corporation with principal offices located at 14133 NW 8th Street, Sunrise, Florida, 33325.
3. ERMI LLC (“ERMI”) is a Delaware limited liability company with its principal offices located at 441 Armour Place NE, Atlanta, Georgia 30342.
4. End Range of Motion Improvement, Inc. (“ERMI Inc.”) is incorporated in Florida, and its principal place of business is 1256 Vinetree Dr., Brandon, FL 33510.
5. Thomas Branch is an individual resident of the State of Georgia and is the founder and sole member of Defendant ERMI, LLC. Defendant Branch may be served with Summons and a copy of this Complaint by delivering the same to him personally at 441 Armour Place NE, Atlanta, Georgia, 30324.
6. ERMI purports to be the assignee and owner of United States Patent No. 7,547,289 (hereinafter, “the ‘289 Patent”). A copy of the ‘289 Patent is attached hereto as **Exhibit A**.

#### **JURISDICTION AND VENUE**

7. This Court has subject matter jurisdiction over this Complaint under 28 U.S.C. § 2201, 2202, 1331 and 1338 as a declaratory judgment action arising under the patent laws, Title 35 of the United States Code. This Court has ancillary jurisdiction over the state law claims between TPO and E.R.M.I., Inc. and between OneDirect and ERMI pursuant to 28 U.S.C. § 1367 because they are so related to the

existing claims in this action that they form part of the same case or controversy under Article III of the United States Constitution.

8. OneDirect resides in the Northern District of Georgia, conducts substantial business in that district, directly or through intermediaries, including regularly doing or soliciting business, engaging in other persistent courses of conduct and/or deriving substantial revenue from goods and services provided to individuals in this district.

9. Venue is proper in this district pursuant to 28 U.S.C § 1331(b), § 1331(c), and § 1400(b) and the order of the United States Judicial Panel on Multidistrict Litigation entered on October 2, 2019.

10. An actual case or controversy has arisen between the parties regarding the validity and infringement of the ‘289 Patent. A judicial declaration that the claims of the ‘289 Patent are invalid and that OneDirect has not infringed any valid claim of the ‘289 Patent is necessary and appropriate at this time so that OneDirect may ascertain its rights and duties with respect to the ‘289 Patent.

### **BACKGROUND FACTS**

11. ERMI has filed suit against Defendants and OneDirect’s actual and alleged business partners, customers and/or distributors by asserting claims of infringement in at least seven (7) different jurisdictions nationwide specifically directed to a OneDirect product (hereinafter, the “Distributor Cases”).

12. ERMI filed these Distributor Cases asserting claims of patent infringement related to OneDirect’s Orbit for Shoulder device (hereinafter, the “Accused Device”) in federal courts in Florida, North Carolina, Illinois, Washington, California, Michigan and New Jersey.

13. OneDirect was not named as a defendant in any of the first six Distributor Cases filed on April 1, 2019.

14. On April 4, 2019, OneDirect filed suit in the Northern District of Georgia, where both ERMI and OneDirect, reside seeking a declaratory judgment of non-infringement and invalidity (hereinafter, the “original declaratory judgment action”).

15. On July 30, 2019, rather than litigate the original declaratory judgment action in the district where both ERMI and OneDirect reside, ERMI chose to consolidate and transfer all cases to this court in the United States Judicial Panel on Multidistrict Litigation. The MDL Panel ordered consolidation and transfer to this court on October 2, 2019.

16. In the cases ERMI has filed, it alleges that the Accused Device infringes on the ‘289 Patent, specifically asserting claims 1 and 22 (hereinafter, the “Asserted Claims”) are infringed.

17. In the case ERMI filed against a purported distributor in Washington, it attached a claims chart as Exhibit 7 to its complaint, purportedly showing how the

Accused Device infringed Claim 22 of the ‘289 Patent (hereinafter, the “First Claims Chart”). A true and accurate Copy of the First Claims Chart is attached hereto as **Exhibit B.**

18. On July 19, 2019, in the case ERMI filed in this district, it provided a claims chart purportedly showing how the Accused Device infringed Claims 1-5 and 22 of the ‘289 Patent (hereinafter, the “Second Claims Chart”). A true and accurate copy of the Second Claims Chart is attached hereto as **Exhibit C.**

19. As is explained further, below, the Accused Device does not infringe the ‘289 Patent. Moreover, the Asserted Claims are invalid and/or unenforceable.

20. ERMI’s claims of infringement are therefore baseless and threaten injury to Defendants and their business partners.

### **CLAIMS FOR RELIEF**

#### **COUNT I:** **DECLARATORY JUDGMENT OF NON-INFRINGEMENT** **OF U.S. PATENT No. 7,547,289**

21. Defendants repeat and reallege the allegations of the preceding paragraphs of this complaint as if fully set forth herein.

22. This claim arises under the Declaratory Judgment Act, 28 USC § 2201 et seq., and the patent laws of the United States, 35 USC § 1 et seq. and seeks a declaratory judgment that OneDirect and Defendants have not and do not infringe any

valid and enforceable claims of the '289 Patent.

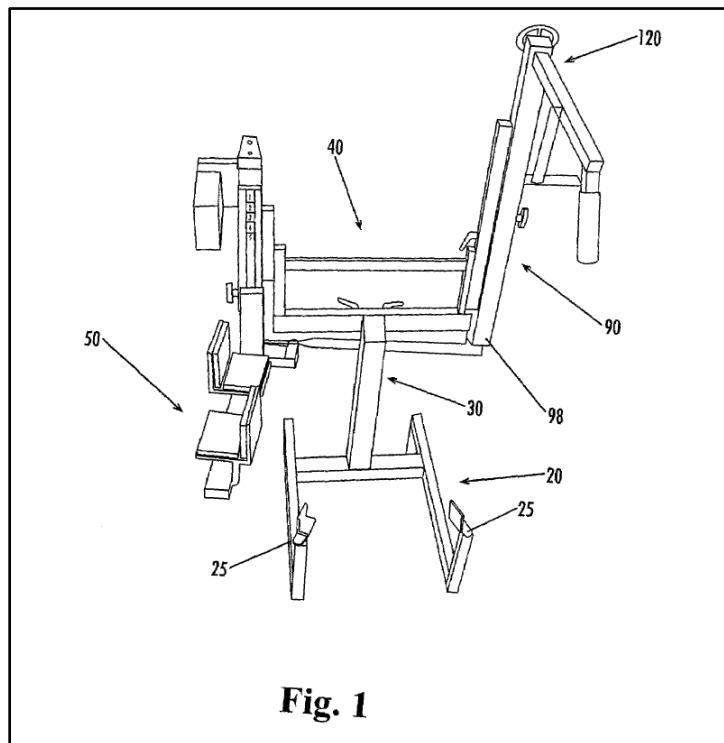
23. ERMI purports to be the assignee and owner of the '289 Patent. *See Exhibit A.*

24. Although it has dropped claims of willful infringement and indirect infringement in two of the Distributor Cases because those defendants were not actual distributors of the Accused Device (California and Washington), ERMI still claims that the Accused Device directly and/or indirectly infringes the '289 Patent in various other complaints filed against Defendants, including OneDirect's business partners and/or customers.

25. Defendants do not make, use, offer to sell or sell, within the United States, or import into the United States, any product that infringes any valid and enforceable claim of the '289 Patent, either directly, indirectly, contributorily, or otherwise, and have not induced others to infringe any valid and enforceable claim of the '289 Patent, including the Asserted Claims, as explained below. (It should be noted that the non-infringement allegations, below, are exemplary and not exhaustive because ERMI has yet to provide infringement contentions in this case or even describe the purported infringement with any specificity whatsoever. Defendants will provide complete non-infringement contentions in accordance with the schedule for such disclosures in this case.)

26. First, the Accused Device does not practice the invention claimed in Asserted Claim 1 of the ‘289 Patent. For example, and not by way of limitation, the Accused Device does not include the “frame” limitation of Asserted Claim 1.

27. The claimed “frame” of the ‘289 Patent is described throughout the Specification as a substantially rectangular structure that is formed by a main horizontal member, vertical side members, and a secondary horizontal member and includes two “mounting locations.” The claimed “frame” is depicted as Item 40 in Figures 1, 6 and 10 of the ‘289 Patent, which are reproduced below.



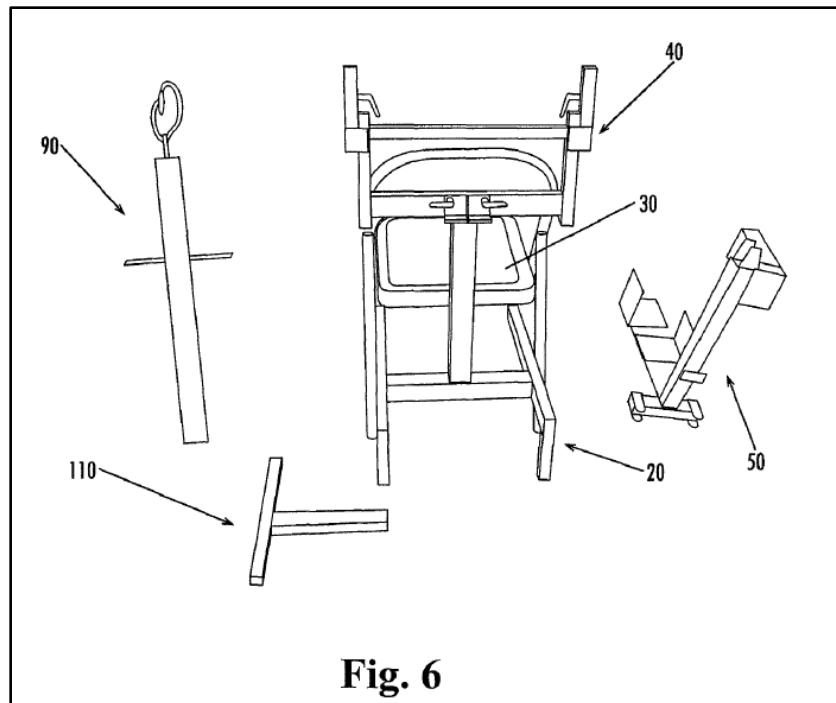


Fig. 6

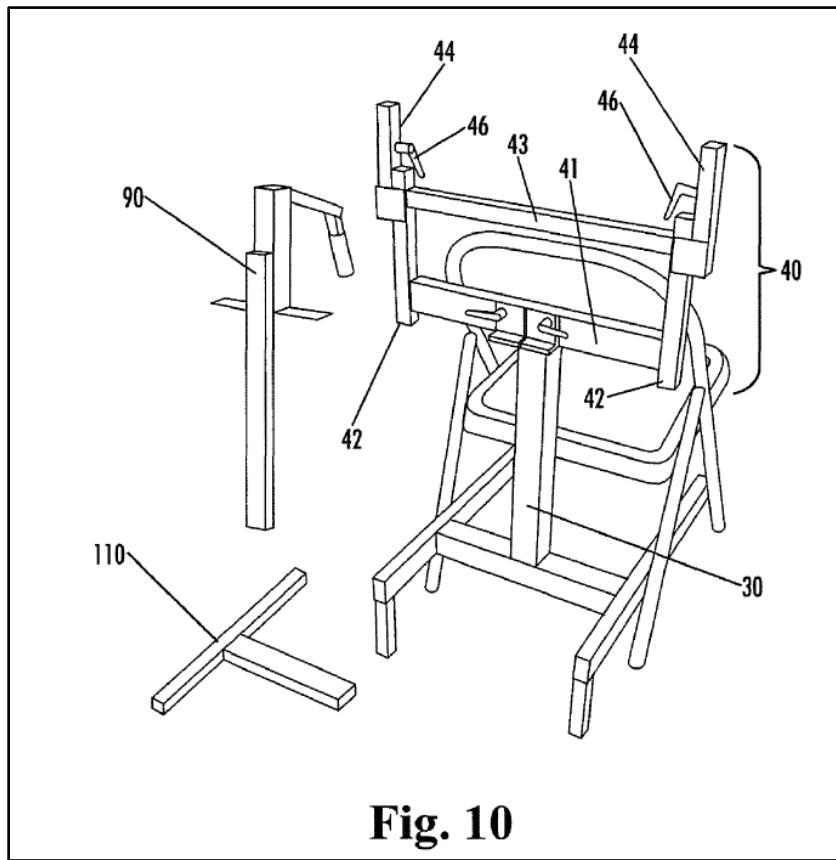
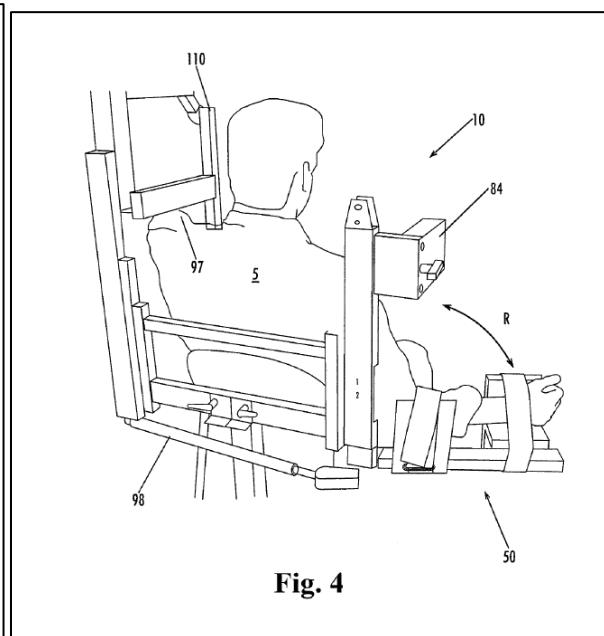
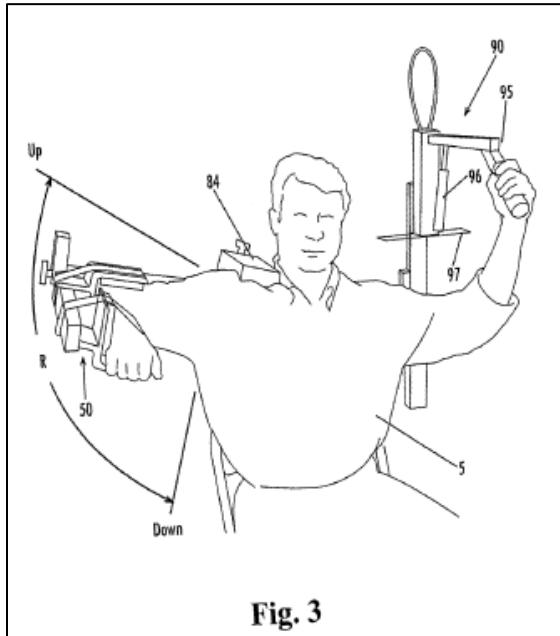


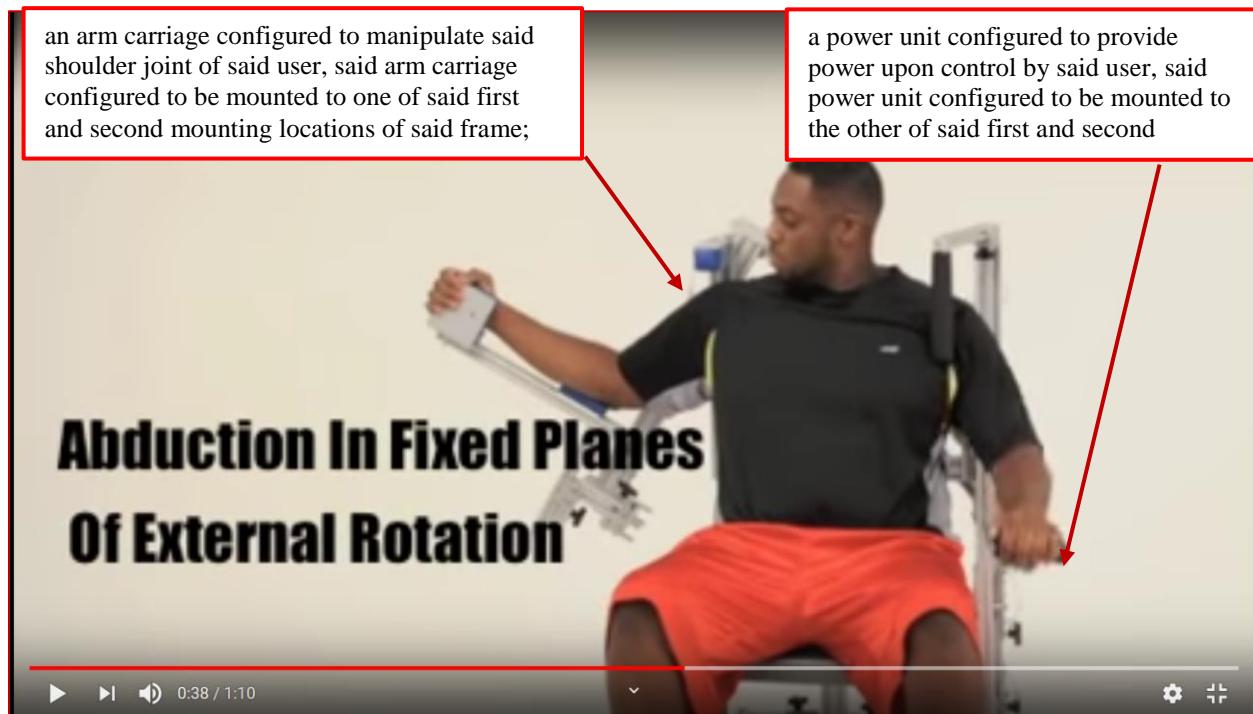
Fig. 10

28. The claimed “frame” of the ‘289 Patent limits the range of motion available to users. Specifically, the claimed apparatus, including the frame, only provides static-progressive stretching from a limited number of fixed points (with respect to its “arm carriage” post) in only one plane at a time and is limited even in the one plane it does work in. These limitations are inherent in the design depicted in Figures 3 and 4 of the ‘289 Patent, below.



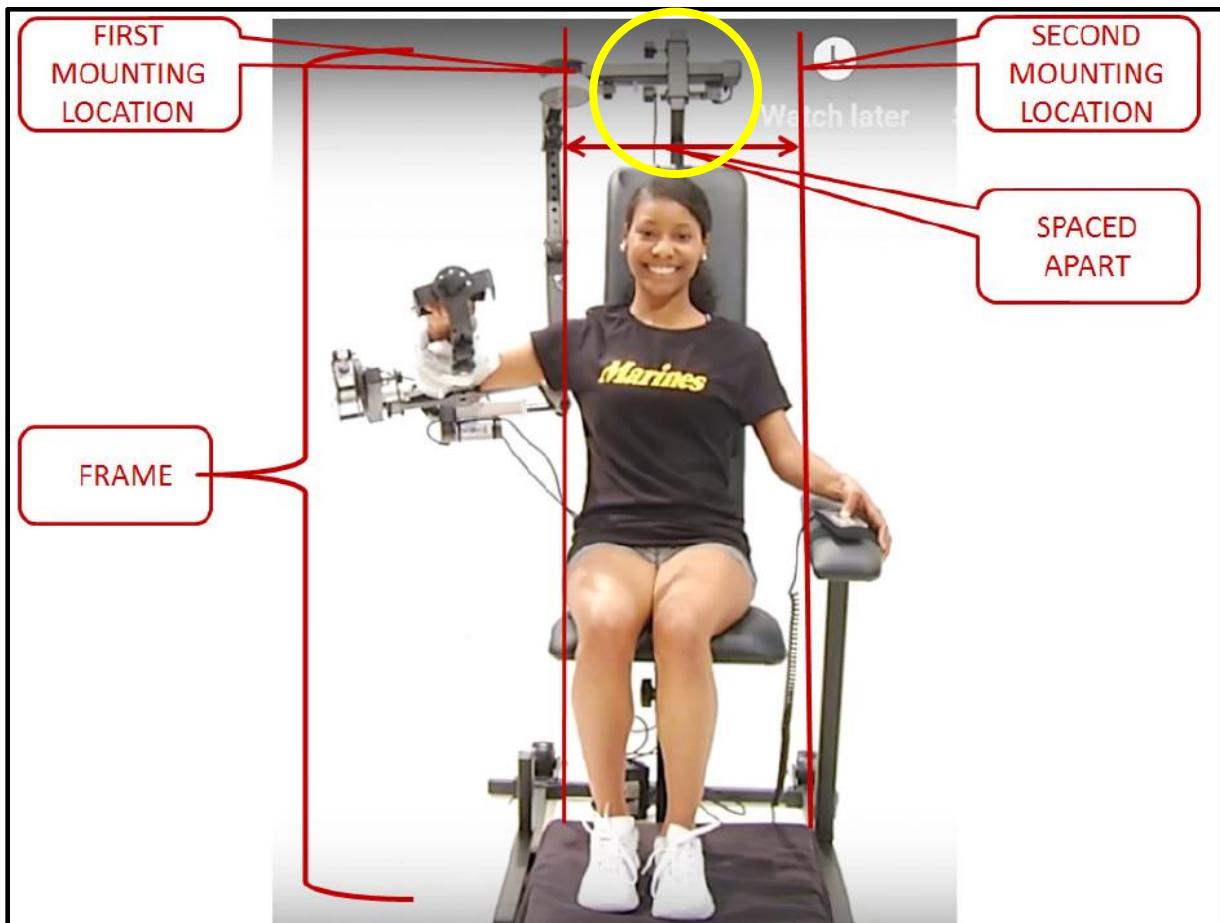
29. Problematically, when a new motion is desired, such as moving from external rotation to abduction, the unit must have the locking pin removed from either the upper arm carriage or the lower arm carriage and then reset. As a result, a patient frequently cannot perform therapy alone and must have an ERMI representative involved directly.

30. Claim 1 teaches that there are a first and second mounting location on the frame. These are clearly shown in the publicly available images and videos of the ERMI device. Below is screenshot of a video posted by ERMI on its website on January 15, 2013, with boxes and arrows added to depict the first and second mounting locations on the frame:



31. A review of the claims and contentions in the Second Claims Chart further demonstrates that the Accused Device does not infringe the '289 Patent. Far from having two mounting locations on both sides of the frame, the Accused Device has one single mounting location in the back as depicted by the yellow circle superimposed on the Second Claims Chart below. Contrary to the actual construction

of the Accused Device with a single mounting location on the back, ERMI has drawn two hypothetical mounting locations for the arm carriage and power shown by parallel vertical red lines:



32. Below is a true and accurate picture of the back of the Accused Device showing the one and only connection of the linkage member to the backrest, circled in yellow.



33. The electrical power unit for the Accused Device is circled in red in the above picture and is permanently affixed to the backrest. This electrical power unit is neither a manually operated hydraulic pump described in the specifications of the '289 Patent, nor is it switchable from one side of the "frame" to the other<sup>1</sup> as taught in the

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<sup>1</sup> It can be moved lower on the backrest, under the seat or laid on the floor. The only place it cannot be mounted is on the "other", or front, side of the seat, where it would be between the seat and the user.

‘289 Patent (See, e.g., ‘289 Patent, col. 6, lines 12-19; col. 8, lines 17-20; col. 10, lines 20-32; Claim 1 (“... said power unit configured to be mounted to the other of said first and second mounting locations of said frame.”) (Emphasis added.))

34. In contrast, the support structure used in the Accused Device is not the same or the equivalent of the “frame” limitation of Asserted Claim 1. Unlike the device claimed in Claim 1, the Accused Device utilizes a support structure built into the chair that was designed to act as a “planetary rotational system” with the patient (not the frame) being the “center of the universe.” This “patient-centric” support structure is depicted below.



35. The patient-centric design of the Accused Device is not the same as, and is in fact substantially different from, the frame-based system claimed in Asserted Claim 1. For example, instead of a rectangular structure with two separate “mounting”

placements that is formed by a main horizontal member, vertical side members, and a secondary horizontal member, the Accused Device uses a “floating” or “suspended” swivel that emanates from the spine of the chair (not the two mounting locations on the frame as required by the Asserted Claims of the ‘289 Patent) and allows the shoulder manipulation components to rotate around a fully adjustable chair, which can be customized to the user before, during, and after operation.

36. The substantial differences between the claimed “frame” of the ‘289 Patent and the support structure of the Accused Device allow the treatment of certain conditions that arise from the use of a fixed chair, such as “shoulder hiking.” For example, the design of the Accused Device allows the chair to decline which in turn allows shoulder blade retraction, which will aid in reduction of shoulder hiking.

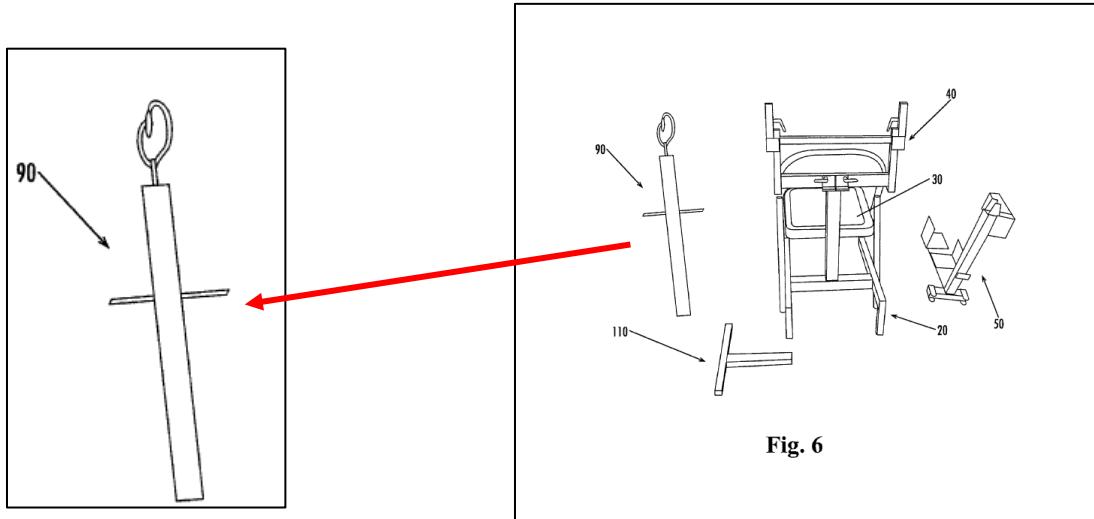
37. Further, the support structure of the Accused Device utilizes “mechanical joints” that are aligned with patients’ anatomical joints to “mirror” a patient’s axis-of-rotation in the x, y, z planes thus allowing for horizontal, rotational, abduction/adduction motions in an uninterrupted manner. Moreover, the design of the support structure of the Accused Device allows for either isolated range of motion (“ROM”) movement at any point in one plane or for ROM therapy in 3-D multi-plane movement. This multi-plane movement when coupled with ability to engage in resistance strength training through the Accused Device enables patients to receive

functional ROM therapy as opposed to only receiving static-progressive ROM stretching. In short, the design of the support structure used for the Accused Device is substantially different from the structure disclosed and claimed in the ‘289 Patent.

38. In addition, for example, and not by way of limitation, the Accused Device also does not include the claimed “power unit configured to be mounted to the other of said first and second mounting locations of said frame” required by Claim 1.

39. The Specification of the ‘289 Patent describes the claimed “power unit” as a manually operated hydraulic pump that is powered by the patient using a pump handle. (This manual unit is noticeably distinct from the electronic controllers of the prior art.) The unit must also be removable and switched between one of two mounting locations on opposite sides of the frame, and thus, opposite sides of the patient that is receiving treatment. (*See, e.g.*, ‘289 Patent, col. 6, lines 12-19; col. 8, lines 17-20; col. 10, lines 20-32; Claim 1 (“... said power unit configured to be mounted to **the other of said first and second mounting locations** of said frame.”) (Emphasis added.))

40. The “power unit” of the ‘289 Patent is identified as a manual pump referenced as element 90 (in an expanded view) in Figure 6 of the ‘289 Patent, reproduced below.

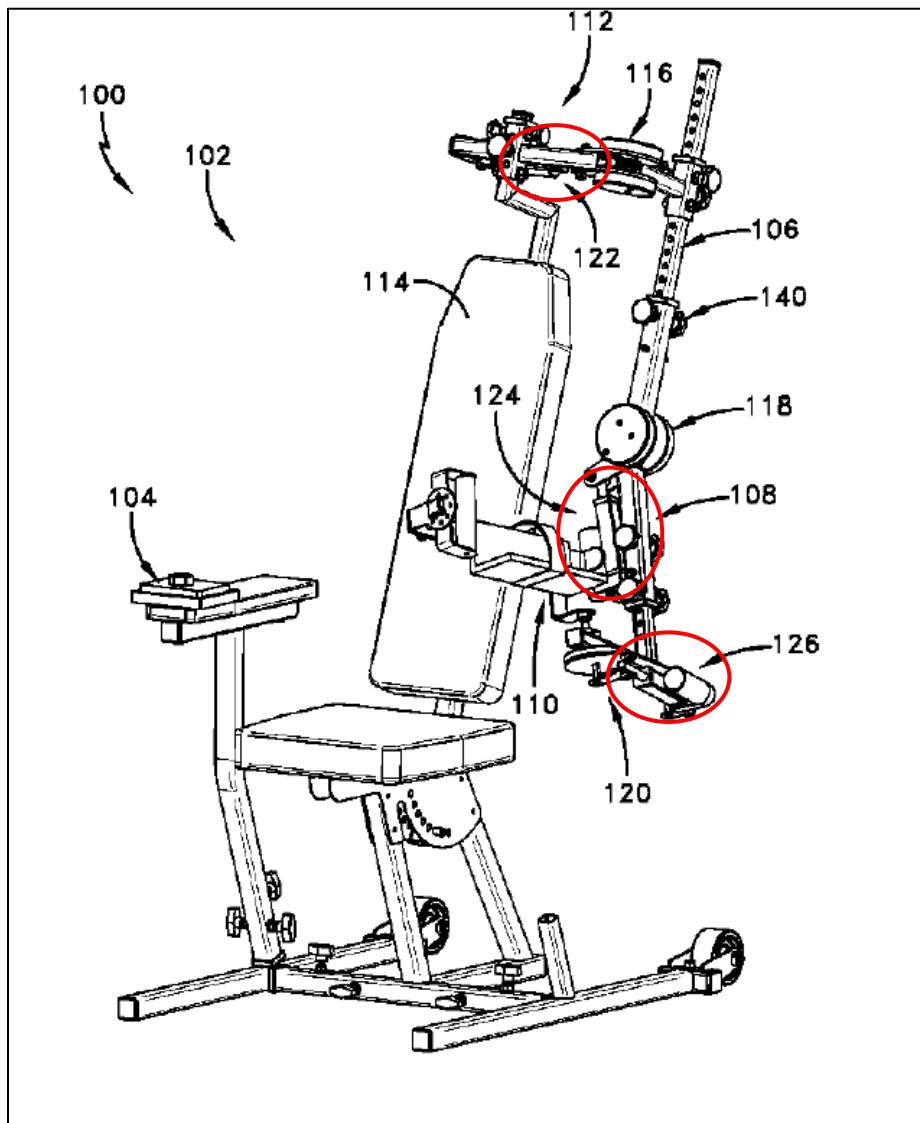


41. The Specification describes element 90 as a manually operable device that is “configured to *convert mechanical energy from the user* to hydraulic energy.” (‘289 Patent, col. 3, lines 4-12; col. 6, lines 51-55; col 9, line 37 to col. 10, line 19 (emphasis added).) Likewise, the figures of the ‘289 Patent depict the “power unit” as being manually “pumped” by the user. (See, e.g., ‘289 Patent, Figures 3 and 4, above.)

42. The Accused Device, however, does not utilize the claimed “power unit.” The Accused Device is instead substantially different and includes, among other things, electrical power with full automation and a touch control system that operates (the “actuators”) that are installed *on the same side* of the patient that is receiving treatment, rather than the opposite side as is required by Asserted Claim 1, as can be

seen in items 122, 124 and 126, circled in red on the drawing from OneDirect's '234

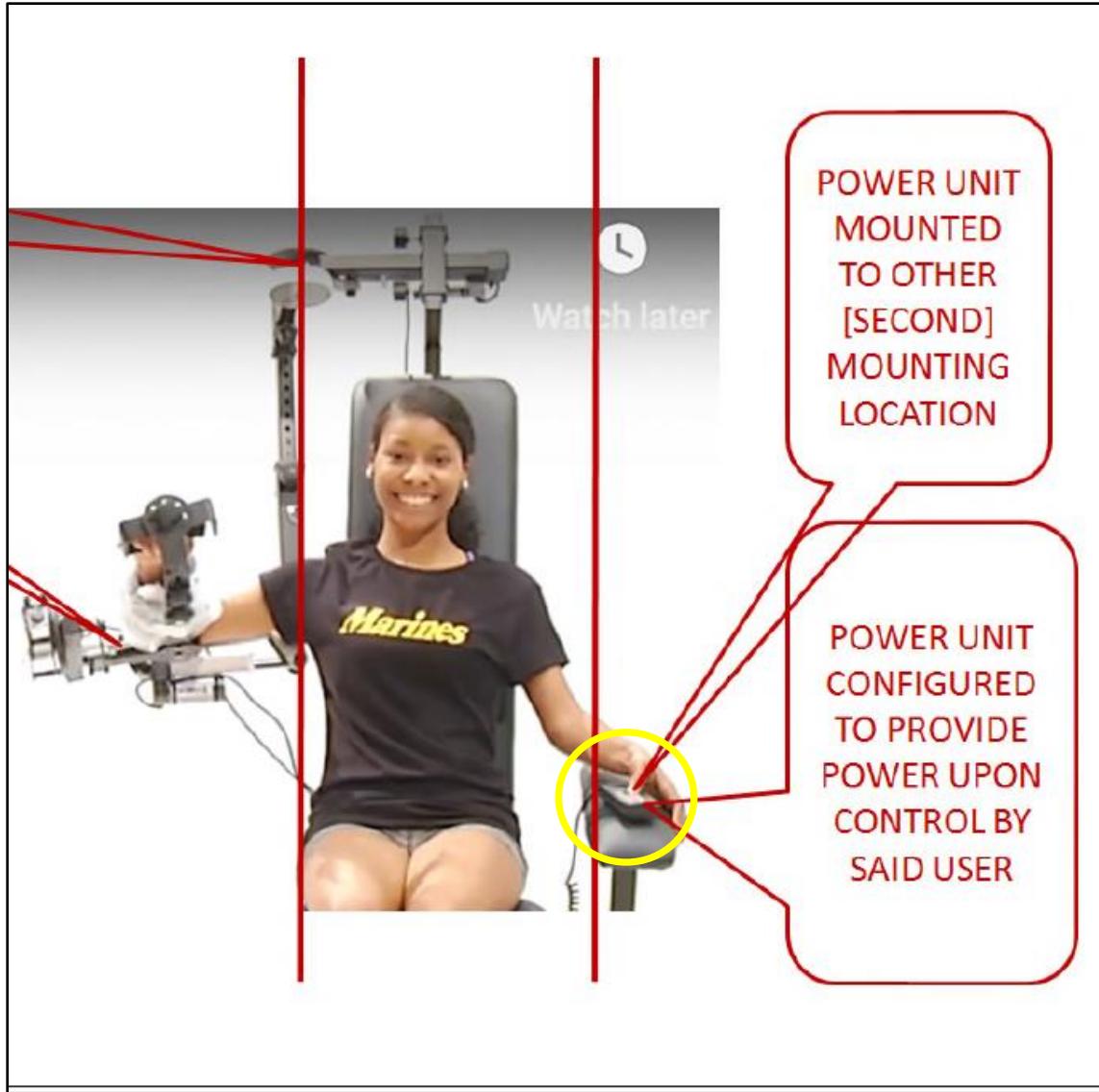
Patent below:



43. The electric powered linear screw driven actuators are clearly shown on the arm carriage itself in the photograph below:



44. Ignoring both the electrical power unit on the back and the actuators on the arm carriage, as shown in the image from the Second Claims Chart below, ERMI claims that the hand-held control element resting on the armrest (circled in yellow) is the “power unit mounted to other [second] mounting location.” Moreover, ERMI conveniently omits the requirement that the “power unit” must be “configured to be mounted to the other of said first and second mounting locations of said frame.”



45. Because claims 2-5 are dependent to claim 1, the Accused Device does not infringe claims 1-5 of the '289 Patent.

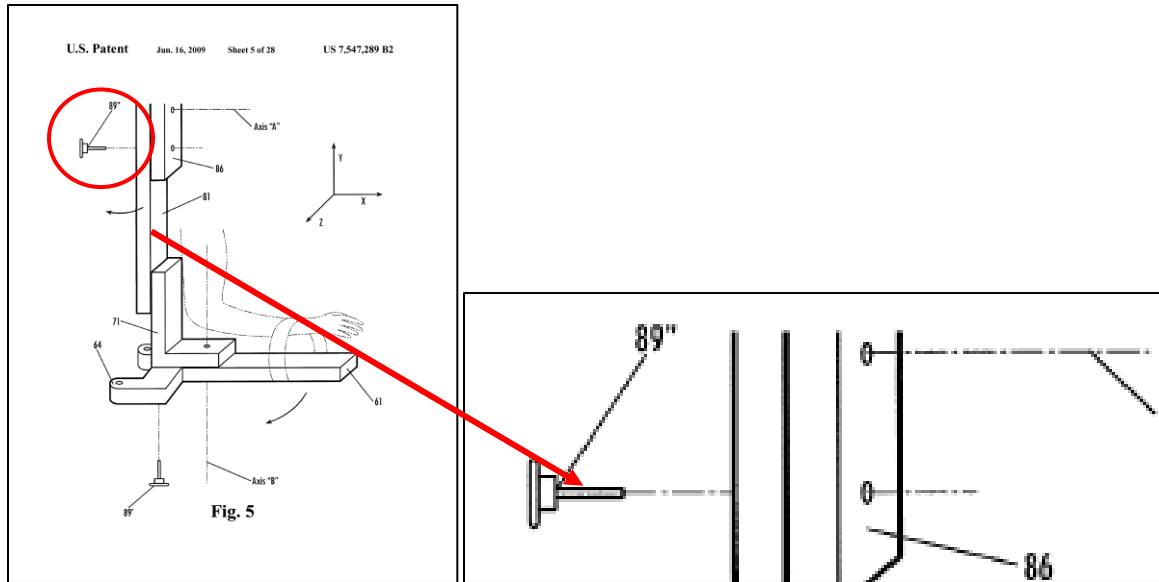
46. The electrically powered actuators that operate the Accused Device are in fact substantially different from the rudimentary "power unit" disclosed and claimed in the '289 Patent. The actuators of the Accused Device allow full range of motion

manipulation of the patient's shoulder across multiple planes as well as simultaneous movement in multi-plane action. In addition, the entire system is controlled by a hand-held control element which allows the user to manipulate their arm in multiple planes at the press of a button. The control element includes the capability of storing digital information and delivering pre-set protocols with the ability to set end range limits per the treating physician's instructions which allows patients to engage in strength training exercises, none of which is possible with the "simple" design of the '289 Patent.

47. Thus, the Accused Device does not practice the invention disclosed in Asserted Claim 1 because, *inter alia*, the Accused Device lacks the required elements of (i) a "frame," (ii) an "arm carriage" that is "mounted to one of said first and second mounting locations of said frame", (iii) "a power unit" that is operated manually and is (iv) "configured to be mounted to the other of said first and second mounting locations of said frame" opposite of the shoulder that is being manipulated.

48. Moreover, the Accused Device does not infringe Asserted Claim 22 of the '289 Patent. Asserted Claim 22 includes both apparatus and method claim limitations (discussed further below), including, for example, the same "frame" limitation included in Asserted Claim 1. Therefore, the Accused Device does not infringe Asserted Claim 22 for at least the reasons set forth above.

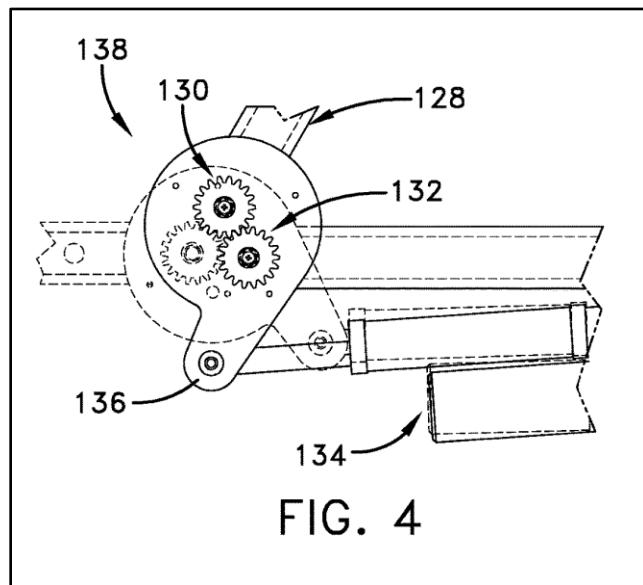
49. In addition, Asserted Claim 22 includes limitations requiring assemblies to be “pivotably mounted to said [frame] [upper arm assembly].” The term “pivotably mounted” is not used in the Specification. However, it is understood that the term “pivotably mounted” refers specifically to the use of a “pivot fixing pin” to allow the upper arm and forearm assemblies to revolve around a pivot axis. (See, ‘289 Patent, Figs.5, 13, and 16 (element 89).) This pivot fixing pin of the ‘289 Patent is depicted in Figure 5, reproduced below, as element 89, expanded below.



50. The “pivot fixing pin” is described in the Specification as “positionable at two separate locations, in order to provide two differing pivoting configurations.” (‘289 Patent, col. 3, lines 1-3.)

51. The design of the Accused Device does not use the pivot mounting-system disclosed and claimed in the ‘289 Patent. Instead, the Accused Device utilizes a tri-

actuator, “polycentric gear.” This gear utilizes not a single pivot point but instead uses a plurality of gears with more than one center, which allows greater range of motion and better treatment options. An example of the polycentric gear used in the Accused Device is depicted, for example, in U.S. Patent Number 10,293,198 (*Marti*), Figure 4, which is reproduced below.



52. In this polycentric gear system, outer gear 130 rotates around central gear 132 when actuator 134 rotates lever 136, causing the rotation of link member 128. The polycentric gear system imitates or matches a rotating shoulder joint and can reduce arm migration when an arm is rotated through a range of motion, reducing risk of future injury. (See, e.g., '198 Patent, col. 5, line 54 to col. 6, line 5.) In sum, the gear system used in the Accused Device is substantially different in the function that is performed, the way it is performed, and the result that is achieved than the pin-pivot

structure disclosed and claimed in the ‘289 Patent.

53. Similarly, Asserted Claim 22 requires movement “about a [second] [third] axis” and movement around “parallel” axes. Because the Accused Device utilizes a planetary gear (the “polycentric gear system” described above) rather than the claimed pin-pivot design, these elements are also not met, and the Accused Device does not infringe Asserted Claim 22.

54. In addition, Asserted Claim 22 of the ‘289 Patent requires “an upper arm assembly pivotably mounted relative to said frame about a second axis, said second axis being substantially parallel to said first axis . . .” There is no infringement because this claim element is not satisfied. For example, and not by way of limitation, the diagrams referenced above show that Accused Device does not have an “upper arm assembly pivotably mounted relative to said frame about a second axis, said second axis being substantially parallel to said first axis.” Because this claim element is not satisfied, the Accused Device does not infringe Asserted Claim 22.

55. Finally, neither OneDirect nor its business partners treat patients and thus do not perform any of the claimed method steps of Asserted Claim 22. For this additional reason, neither OneDirect nor its distributors can directly infringe Asserted Claim 22. The doctors who prescribe use of the Accused Device, and the physical therapists who administer its use pursuant to the doctor’s orders are immune under 35

U.S.C. §287(c).

56. An actual, present and justiciable controversy has arisen between Defendants, OneDirect, and OneDirect's customers and distributors, and ERMI concerning OneDirect's Accused Device, and a judicial declaration is necessary under these circumstances to resolve this controversy.

57. Defendants request a declaratory judgment that it does not make, use, offer to sell or sell, within the United States, or import into the United States, any product that infringes any valid and enforceable claim of the '289 Patent, either directly, indirectly, contributorily, or otherwise, and has not induced others to infringe any valid and enforceable claim of the '289 Patent.

**COUNT II:**  
**DECLARATORY JUDGMENT OF INVALIDITY**  
**OF U.S. PATENT NO. 7,547,289**

58. Defendants repeat and reallege the allegations of the preceding paragraphs of this complaint as if fully set forth herein.

59. This claim arises under the Declaratory Judgment Act, 28 USC § 2201 et seq., and the patent laws of the United States, 35 USC § 1 et seq. and seeks a declaratory judgment that the '289 Patent is invalid and/or unenforceable.

60. The Asserted Claims of the '289 Patent are and have been invalid and void on the grounds that the purported invention, attempted to be patented therein, fails to

meet the conditions of patentability specified in Title 35 of the United States Code, including, but not limited to, the conditions specified in 35 USC §§ 101, 102, 103, and/or 112 of the Code as is explained below. (It should be noted that the invalidity and unenforceability allegations, below, are exemplary and not exhaustive. Defendants will provide complete invalidity contentions in accordance with the schedule for such disclosures in this case.)

61. First, the Asserted Claims do not meet the standards for patent eligibility set forth in Section 101 as interpreted by the United States Supreme Court in *Mayo* (*Mayo v. Prometheus*, 566 U.S. 66 (2012)) and *Alice* (*Alice Corp. v. CLS Bank International*, 573 U.S. 208, 134 S. Ct. 2347 (2014)). Specifically, the Asserted Claims of the ‘289 Patent are directed to the abstract idea of providing standard physical therapy to the human shoulder. Notably, the purported inventions of the Asserted Claims are not directed to any technical improvement and instead include rudimentary designs that have long been in existence. In fact, examination of the Asserted Claims reveals there is no “inventive concept” as is required by *Mayo* and *Alice*. Considering each claimed limitation individually and collectively, it is clear that the Asserted Claims are directed to “well-understood, routine, conventional activit[ies] previously known to the industry” that fail to transform the Asserted Claims into a patent eligible concept.

62. Second, the Asserted Claims are anticipated by at least U.S. Patent Number 5,417,643 (*Taylor*) and U.S. Patent Number 6,695,795 (*Knoll*). For example, Asserted Claim 1 is anticipated by at least *Taylor*. Specifically, again by way of example, and not by way of limitation, *Taylor* **under ERMI's interpretation of the Asserted Claims** discloses each of the limitations of Asserted Claim 1: (a) an apparatus for manipulating a shoulder joint comprised of: a frame with two spaced part first and second mounting locations (*see, e.g.*, '643 Patent, Figs. 1 and 2 (teaching a stationary frame 12 and an arm carriage 18) movably mounted relative to the frame)); (b) an arm carriage configured to be mounted to one of the first or second mounting locations (*see, e.g.*, '643 Patent, col. 6, lines 36-50); (c) a power unit that provides power upon control by the user<sup>2</sup> (*see, e.g.*, '643 Patent, Figs. 3 and 4); (d) a linkage between the arm carriage and the power unit configured to transfer power (*see, e.g.*, '643 Patent, Figs. 1 and 2 (teaching a motivator assembly 18 with elevation drive unit 20 and rotation drive 30 which is connected to drive unit 20 by connecting bracket 29)); and (e) wherein the arm carriage, power unit, and linkage can be switched to provide treatment to each shoulder (*see, e.g.*, '643 Patent, col. 6, lines 36-50)). Thus, *Taylor*

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<sup>2</sup> It should be noted that Defendants do not agree that the placement of the power unit of the Asserted Claim 22 can be either electronic or on the same side as that which is receiving treatment. In this circumstance, Defendants have used the apparent claim construction utilized by ERMI in its patent infringement claims, which is demonstrably incorrect.

discloses each of the apparatus elements of Asserted Claim 1.

63. Asserted Claim 22 is also anticipated by at least *Knoll* and *Taylor*. By way of example, and not by way of limitation, as is noted above, *Knoll* discloses the apparatus elements of Asserted Claim 22 expressly and the remaining method elements inherently. Specifically, *Knoll* teaches a frame 1, a seat 5, and an arm carriage 2 including a first arm carriage portion 13 pivotably mounted relative to the frame at a first pivot location 4 and about a second axis which is substantially parallel to the first axis when it is rotated 90 degrees clockwise about pivot 3 (see '795 Patent, Figure 1). The arm carriage would rotate toward the viewer until the upper arm is extending along the coronal plane. At this point the rotational axis of the shoulder pivot 4 would extend parallel to the first axis. Both rotational axes of pivot location 14 or 20 would be orthogonal to the second axis in this position. The second arm carriage portion 15 is pivotably mounted relative to the first arm carriage portion 13 at a second pivot location 14 or 20 and is configured to capture a forearm of the user. The arm carriage is pivotably mounted at the first pivot location 4 relative to the frame so as to provide a first abduction/adduction of the shoulder ('795 Patent, col.6, lines 16-18). The second arm carriage portion 15 pivots relative to the first arm carriage portion 13 about the second pivot location 20 to provide external rotation movement of the shoulder ('795 Patent, col. 6, lines 18-20). The upper arm of the patient would

rotate about its longitudinal axis when the forearm is rotated about pivot location 20 regardless of the position of the upper arm. When the first arm carriage portion 13 rotates about pivot 4 such that it is directed downwards adjacent the side of the torso of the user or in a generally vertical position, the pivot axis of pivot 20 moves from a horizontal orientation as shown in Figure 1 to a generally vertical position with the forearm of the user being horizontal. When the arm carriage 15 pivots the shoulder in external rotation about pivot 20 the arm carriage 15 would rotate about the vertical axis of pivot 20. Regarding the language that the device is configured such that one of the pivot locations is lockable while the other pivot location is allowed to pivot, *Knoll* teaches in column 3, lines 41-47:

the characteristic feature of such a therapy device according to the invention is that at least two rail sections are interlinked via a first rotary and/or pivotal joint with free-moving and lockable motion and that the lower arm rest is rotatable and lockable by means of a second pivot joint attached to the front, free-moving rail section around is longitudinal axis.

*Knoll* teaches that the pivot locations are lockable to allow desired relative movement. Thus, *Knoll* discloses each of the apparatus elements of Asserted Claim 22, while the remaining claimed method elements are taught expressly or are inherent in the normal and usual operation of the apparatus.

64. Third, at least both Asserted Claims are invalid as obvious under Section 103 considering at least *Knoll*, *Taylor*, and/or U.S. Patent Number 5,407,420 (*Bastyra*) in combination with *Knoll* or *Taylor*. By way of example, and not by way of limitation, Asserted Claim 22 is invalid because the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Specifically, *Knoll* discloses a device for manipulating the shoulder of a user that is seated in an upright position that is comprised of a frame, a seat, an upper arm assembly, and a forearm assembly. The remaining “method” claim limitations of Asserted Claim 22 are performed during routine treatment using shoulder pivot joint 3, 4 such that the point of intersection of the joint axes are positioned roughly in the patient’s shoulder region. While a first shoulder pivot joint 3 defines a horizontal pivot level, a second shoulder pivot joint 4 allows a vertical pivot movement of the arm rail 2, which allows the shoulder abduction / adduction and rotation methods described in Asserted Claim 22 to be performed. On information and belief, such movements are standard treatments / therapies for the human shoulder that have long pre-dated the ‘289 Patent. (See, e.g., ‘289 Patent, col. 1, line 20 to col. 2, line 6.)

65. Fourth, at least Asserted Claim 22 is invalid for two separate failures to comply with the requirements for patentability set forth in Section 112(b). (Notably, the prosecution of the application that issued as the ‘289 Patent is marked by repeated rejections for failures to comply with 112(b).) To begin with, Asserted Claim 22 is invalid for attempting to claim more than one class of patentable subject matter. Specifically, Asserted Claim 22 attempts to claim both a system and a method for using that system, which renders the claim indefinite and thus invalid. Asserted Claim 22 initially claims “providing”<sup>3</sup> an apparatus comprised of a frame, a seat, an upper arm assembly, and a forearm assembly. These are the major components of the claimed apparatus and, in fact, the Specification represents that the claims are each directed to the claimed apparatus. (See, e.g., ‘289 Patent, col. 5, lines 49-55 (“General Operation. ***The apparatus and method of using same*** is configured to provide patient control of joint range of motion and ***particularly relates to a [sic] apparatus for providing control of the range of motion of a human shoulder.***”) Then, after reciting the elements of the claimed apparatus, Asserted Claim 22 claims standard methods of treatment using the claimed apparatus. (See Asserted Claim 22, Elements (B)-(F).)

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<sup>3</sup> This attempt to invoke method claim language is a sham, as the claimed limitations are clearly directed to the apparatus of the ‘289 Patent. In fact, the Specification acknowledges the patent claims are directed to the claimed apparatus and “method of using same.”

In sum, Asserted Claim 22 claims both an “apparatus and a method of using same,” which renders the claim indefinite and thus invalid.

66. In addition, Asserted Claim 22 is indefinite and thus invalid under Section 112(b) for incorporating terms that, considering arguments advanced during prosecution, fail to advise an ordinarily skilled artisan of the nature and scope of the claimed invention. Specifically, Asserted Claim 22 claims, *inter alia*, “a seat for a user to sit in such that said user can sit in said seat in said substantially upright sitting position while facing a direction substantially along a first axis, said axis being substantially horizontal.” The different uses of the term “axis” in Asserted Claim 22 confuses the concepts of orientation and direction. This confusion is heightened by the arguments made by the applicant in which the three claimed axes are referred to as “pivot axes.” This language indicates the seat is intended to pivot (or spin) around the horizontal first axis, which is not disclosed or taught anywhere in the Specification. This argument renders the claim indefinite for failing to particularly point out and distinctly claim the invention of Asserted Claim 22.

67. The ‘289 Patent is also unenforceable based on inequitable conduct committed by the Applicant through his counsel during prosecution of the ‘289 Patent. During prosecution, the patent applicant misrepresented or omitted material information with the specific intent to deceive the United State Patent and Trademark

Office (“PTO”). Specifically, for example, the Applicant through his counsel, Greggory T. Gronholm, made misleading arguments to Examiner Danton DeMille during prosecution of what issued as Asserted Claim 22. For example, in a Reply to Office Action of February 27, 2008, the Applicant argued for allowance over the Examiner’s rejection of the claim as unpatentable over ‘643 Patent (*Taylor*):

As may be seen, this claim has been amended to more specifically claim the particular orientation of the various pivot axes (note the first, second, and third pivot axis language). It will also be seen that a significant amount of text has been added to clarify the various elements used in this method claim (frame, seat, upper arm assembly, etc.). This and other language is submitted to clearly distinguish the cited *Taylor* reference, which does not include the specific pivoting relationship claimed by the applicant, which is not surprising as the *Taylor* unit is intended for a different type of limb manipulation. For the record, note the “horizontal plane” limitation has been withdrawn.

While on the subject, it will also be noted that the same arguments apply to this Claim 35 [issued as Claim 22] in distinguishing the *Knoll* reference; as noted elsewhere in this response the *Knoll* reference does not include the above-noted distinctions regarding the three claimed pivot axes.

68. The Examiner, apparently relying on the foregoing arguments, allowed the claim on May 8, 2008.

69. The arguments made by the applicant are misleading because they intentionally add uncertainty by claiming the existence of three “pivot axes” when the

Specification, including the Asserted Claim 22, only discloses *two axes that pivot*. (See, e.g., ‘289 Patent, Claim 22; Fig. 5 (Axis “A” and Axis “B”) and Fig 13; col. 3, lines 1-3 (“FIG. 5 can be used to show the use of a single pivot-fixing pin 89, alternately positionable at two separate locations, in order to provide two *differing pivoting configurations.*.”); col. 6, lines 20-37 (describing pivoting Axes A and B) and 38-46 (describing *directional* axis “X”); col. 9, lines 13-24 (describing “fixed pivot axis B.”). Additionally, this argument misleadingly suggests that *Knoll* and *Taylor* were different from the claimed invention based on the integration of *three* pivot axes into the inventions claimed in the ‘289 Patent. This is false; each of the references has the same number of axes that pivot as part of a given operation.

70. An actual, present and justiciable controversy has arisen between Defendants and ERMI concerning the validity of the ‘289 Patent and a judicial declaration is necessary under the circumstances to resolve this controversy.

71. Defendants are entitled to a declaratory judgment that each of the Asserted Claims of the ‘289 Patent are invalid and/or not enforceable.

**COUNT III:**  
**DECLARATORY JUDGMENT**  
**OF NO FALSE ADVERTISING**

72. Defendants repeat and reallege the above allegations as if fully set forth herein.

73. This claim arises under the Declaratory Judgment Act, 28 USC § 2201 et seq., and seeks a declaratory judgment that Defendants have not made any intentional false statements in their advertising as claimed in the Florida Distributor Case.

74. In Paragraph 80 of the Florida Distributor Case, ERMI pleads that Defendants Rehab, T-Rex Investment, and OneDirect made the following allegedly “false misrepresentations about ERMI’s device:”

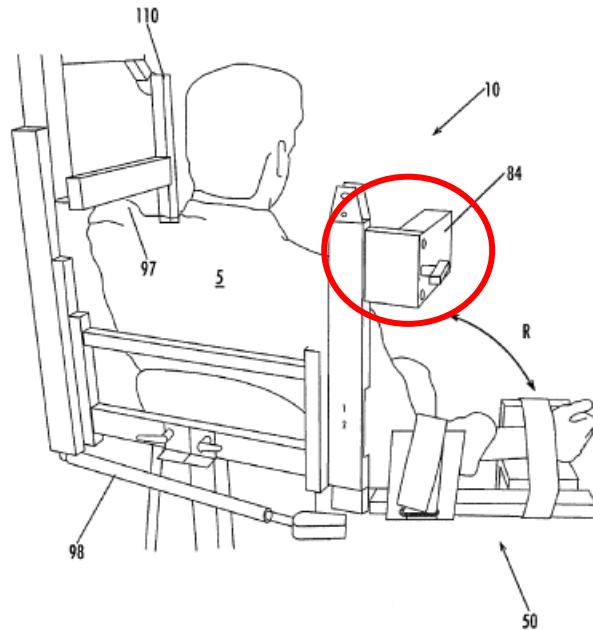
- a. Does not “allow[] movement thru multiple planes.”
- b. Does not allow “internal and external rotation stretching.”
- c. Is not “[anato]mically aligned along the correct ‘axis’ for horizontal, rotational, ab/add[uction.]”
- d. Does not “allow[] for scapular extension.”
- e. Does not “allow[] for retraction motion with int/ext rotation.”

75. Upon information and belief, each of these alleged false misrepresentations about ERMI’s device are, in fact, true and describe the operations and/or limitations of ERMI’s device.

76. Additionally, in Paragraph 82 of the Florida Distributor Case, ERMI also pleads that OneDirect has made the following allegedly “false misrepresentations about ERMI’s device:”

- a. Does not “perform flex and extension.”
- b. Does not have “moderate resistance.”
- c. Does not allow “hyperextension.”

77. Upon information and belief, each of these alleged false misrepresentations about ERMI's device are, in fact, true and describe the operations and/or limitations of ERMI's device. For example, and not by way of limitation, due to the limitations inherent in the design of ERMI's device, the device cannot perform flexion (when you move your arms from a resting position at your side to straight above your head) and extension (moving your arms so they stick out behind you) of the shoulder. As can be seen from the depiction of Figure 4 of the '289 Patent, as reproduced below, neither flexion nor extension can be accomplished due to at least element 84.



**Fig. 4**

78. Finally, ERMI alleges that a OneDirect brochure "contains images of three ERMI devices taken from ERMI's website and identifies the ERMI devices as 'CPM Devices.'" On information and belief, these allegations are not accurate; OneDirect's

marketing brochures contain generic images of other manufacturer's devices and do not identify devices as ERMI devices or even state that all depicted devices are "CPM Devices." Instead, the brochure clearly states that any CPM Devices that are depicted are not manufactured by T-Rex (*i.e.* OneDirect).



\*CPM devices pictured are sold by other companies, not T-REX

**\*CPM devices pictured are sold by other companies, not T-REX**

79. Moreover, even if ERMI devices were identified, any unintentional misstatements as to the capabilities or operation of devices similar to ERMI's caused no harm to ERMI.

80. An actual, present and justiciable controversy has arisen between Defendants and ERMI concerning ERMI's allegations of false advertising and a judicial declaration is necessary under the circumstances to resolve this controversy.

81. Defendants are entitled to a declaratory judgment that ERMI's allegation of false advertising is unfounded.

**COUNT IV:**  
**TORTIOUS INTERFERENCE WITH BUSINESS RELATIONS**

82. Defendants repeat and reallege the allegations of the preceding paragraphs of this complaint as if fully set forth herein.

83. EMRI has improperly and intentionally interfered with Defendants' prospective business contracts and/or Defendants' prospective business. EMRI's intellectual property claims, including its patent claims, are objectively baseless and were asserted in bad faith. Indeed, such claims are a sham because there is no question the Accused Device does not infringe the '289 Patent. Thus, EMRI has tried to assert (and will continue to try to assert) objectively baseless patent claims against Defendants' and OneDirect's customers.

84. Upon information and belief, EMRI is continuing its campaign of trying to

file frivolous patent claims (based on the ‘289 Patent) against OneDirect and OneDirect’s customers and/or prospective customers. Upon information and belief, EMRI has also engaged in a campaign of sending harassing communications to Defendants’ and/or OneDirect’s customers, claiming that the Accused Device in this lawsuit infringes the ‘289 Patent, when that is not the case at all. Upon information and belief, EMRI did not have any prior relationship to Defendants’ and/or OneDirect’s customers.

85. EMRI’s claims in this action (including its patent claims) were intentionally filed for an improper purpose. EMRI knows that its claims are objectively baseless. In fact, Defendants have repeatedly advised EMRI about the frivolous nature of its claims, including its patent claims regarding the Accused Device. Aware that its claims are objectively baseless, EMRI still charged forward with a frivolous lawsuit against Defendants and their customers with malice and with intent to injure Defendants and their customers.

86. EMRI has filed suit merely to interfere with Defendants’ business relationships and not for any proper purpose. Thus, EMRI has attempted to use its sham lawsuits (or threats of litigation) against Defendants’ customers as a commercial hammer to improperly and tortiously interfere with Defendants’ business relationships. EMRI did so in bad faith and not for any proper purpose.

87. Upon information and belief, EMRI's lawsuit and direct and/or indirect threats to sue Defendants' customers have caused third parties to discontinue and/or fail to enter into a business relationship with Defendants. As just one example, one of OneDirect's potential customers, Corner Stone Clinical Therapies, was very interested in engaging in a distributorship opportunity with OneDirect to distribute the Accused Device. However, directly because of EMRI's frivolous lawsuit against OneDirect and its customers, Corner Stone Clinical Therapies has declined to enter into a business relationship with OneDirect regarding the Accused Device. Upon information and belief, Corner Stone Clinical Therapies would have entered into a profitable relationship with OneDirect if EMRI had not interfered with its baseless claims. Upon information and belief, EMRI did not have any prior relationship with Corner Stone Clinical Therapies.

88. EMRI's frivolous lawsuit has created a chilling effect on Defendants' and OneDirect's ability to enter into business relationships for the Accused Device and also generally precluded Defendants from building business relationships.

89. EMRI's frivolous, sham litigation has proximately caused, and will continue to cause, Defendants to suffer significant damages.

**COUNT V:**  
**TORTIOUS INTERFERENCE WITH CONTRACT**

90. Defendants repeat and reallege the allegations of the preceding paragraphs

of this complaint as if fully set forth herein.

91. EMRI's baseless lawsuits, frivolous patent infringement allegations, and other tortious behavior have interfered with OneDirect's existing contracts causing lost sales exceeding \$1 million. Specifically, and by way of example, and not an exhaustive list, as of April 1, 2019 when ERMI filed the case *ERMI vs. Detroit Medical Devices, LLC and Douglas B. Jones*, in the Eastern District of Michigan, case no. 2:19-cv-10966, Detroit Medical Devices, LLC ("Detroit Medical") had recently become a distributor of the Accused Device. As a direct and proximate result of ERMI's actions, Doug Jones, the owner of Detroit Medical chose not to promote, sell, lease or offer the Accused Device to potential customers until late 2019. Since April 1, 2019, Detroit Medical has done very limited business and has not actively solicited new clients for the Accused Device and continues to refrain from doing so unless and until this lawsuit is resolved. Mr. Jones is very well connected with potential customers in Michigan. ERMI's actions in interfering with Detroit Medical's contract with OneDirect has cost OneDirect over \$1,000,000 so far.

92. EMRI's objectively baseless lawsuit and/or tortious communications have caused Defendants to lose existing and prospective business. For the reasons described above, EMRI's attempt to assert baseless patent infringement allegations (and other baseless claims) as a commercial hammer is improper.

93. EMRI's sham lawsuits and/or tortious communications have proximately caused, and will continue to cause, Defendants to suffer significant damages.

**COUNT VI:**

**UNFAIR COMPETITION UNDER THE LANHAM ACT § 43(a) – 15 U.S.C § 1125(a)**

94. Defendants repeat and reallege the allegations of the preceding paragraphs of this complaint as if fully set forth herein.

95. ERMI's actions alleged above constitute unfair competition under § 43 of the Lanham Act (15 U.S.C. §1125(a)). ERMI has made objectively baseless, material false statements concerning OneDirect's products in a commercial communication, as set forth herein, to harm OneDirect business relations with its actual and potential customers. Specifically, ERMI intentionally and falsely led customers to believe that the Accused Device infringes the '289 Patent and that OneDirect's customers could be liable for patent infringement if they distributed OneDirect's products.

96. ERMI's materially false statements are likely to deceive a substantial portion of their intended audience. That deception is material in that it is likely to, and in fact, has, negatively influenced business decisions of the intended audience of the statements.

97. ERMI's false and misleading statements were made in bad faith.

98. ERMI caused the false and misleading statements to enter interstate commerce.

99. OneDirect's reputation and current prospective business relationships have been irreparably harmed by ERMI's false and misleading statements.

**COUNT VII:**  
**PUNITIVE DAMAGES**

100. OneDirect re-alleges and incorporates by express reference the preceding Paragraphs as if fully restated and set forth herein.

101. ERMI acted with the entire want of care which would raise the presumption of conscious indifference to the consequences of their actions.

102. ERMI acted with the specific intent to cause harm to OneDirect.

103. OneDirect is entitled to receive uncapped punitive damages pursuant to O.C.G.A. § 51-12-5.1 in an amount to be determined by the enlightened conscious of an impartial jury.

**COUNT VIII:**  
**VIOLATIONS OF THE FLORIDA DECEPTIVE AND UNFAIR TRADE PRACTICES ACT**  
**F.S.A. §§ 501.201, ET SEQ.**

104. TPO re-alleges and incorporates the preceding Paragraphs as if fully restated and set forth herein.

105. Pursuant to F.S.A. § 408.812, ERMI and ERMI Inc. are prohibited from offering and/or advertising services to the public without first obtaining a valid license from the AHCA.

106. ERMI and ERMI Inc. are not, nor have they been at any time during the four (4) years preceding the filing of this Complaint, licensed by the AHCA as required by F.S.A. § 408.812.

107. Pursuant to F.S.A. § 400.93(6)(a), ERMI and ERMI Inc.'s failure to obtain a valid license from the AHCA prior to offering and/or advertising services to the public as mandated by F.S.A. § 408.812 constitutes a deceptive and unfair trade practice in violation of the Florida Deceptive and Unfair Trade Practices Act, F.S.A. §§ 501.201, *et seq.*

108. As a direct and proximate result of ERMI and ERMI Inc.'s unfair and deceptive trade practices in violation of F.S.A. §§ 501.201, *et seq.*, Florida consumers who received and/or used home medical equipment provided by ERMI and ERMI Inc. have suffered injury and/or detriment and will continue to suffer injury and/or detriment.

109. As the sole member of ERMI and ERMI Inc., Dr. Branch is and has been a direct participant in the decision not to obtain proper licensing under AHCA.

110. As a direct and proximate result of ERMI and ERMI Inc.'s illegal activity in violation of F.S.A. §§ 501.201, *et seq.*, ERMI and ERMI Inc. have received millions of dollars from medical equipment and services to consumers within the state of Florida in violation of F.S.A. §§ 400.93 *et seq.*

111. As a direct and proximate result of ERMI and ERMI Inc.'s illegal activity in violation of F.S.A. §§ 501.201, *et seq.*, ERMI and ERMI Inc. have caused and will continue to cause actual economic damages to TPO by diverting customers for home medical equipment away from TPO and to ERMI and ERMI Inc.

112. Within the four years preceding the filing of this case, representatives of ERMI and ERMI Inc. have made false, disparaging, and defamatory comments about TPO to actual and potential customers of TPO for the purpose of dissuading those customers from using home medical equipment offered by TPO.

113. Within the four years preceding the filing of this case, TPO was doing business with, and had a good reputation, with the local Veterans Administration offices in Florida.

114. At various times between late 2015 and early 2016, John L. Raineri, District Sales Manager for ERMI and ERMI Inc. in Florida, made false, disparaging, and defamatory statements to actual and potential customers of TPO, including but not limited to representatives of the VA. These statements include but are not limited

to statements such as “don’t you know that there is a lawsuit against T-REX because the patient was injured using T-REX.”

115. The statements made by Mr. Raineri were made within the line and scope of his employment with ERMI and ERMI Inc.

116. On March 18, 2016, Brian Kopelowitz (on behalf of T-Rex Rehab, LLC, an affiliated company with TPO, which at the time, was the manufacturer of the T-Rex devices provided by TPO) wrote a cease and desist letter to Mr. Raineri. A true and accurate copy of Mr. Kopelowitz’s letter is attached hereto as **Exhibit D** and incorporated herein.

117. Since Mr. Raineri made those statements to the VA, TPO has lost all of its business with the VA in Florida and has not been able to provide home medical equipment to any VA patient.

118. TPO has never been sued because a patient was allegedly injured using a TPO device.

119. ERMI and ERMI Inc.’s false, disparaging, and defamatory statements have proximately caused actual economic damages to TPO by diverting customers, including but not limited to VA patients, for home medical equipment to ERMI and ERMI Inc.

120. TPO is entitled to an award of actual damages in the form of actual lost profits sustained by TPO through the date of trial.

121. Pursuant to F.S.A. § 501.211, TPO is entitled to an injunction to prevent ERMI and ERMI Inc. from offering home medical equipment for sale or lease in Florida until such time as it is in full compliance with ACHA.

122. Pursuant to F.S.A. § 501.211, TPO is entitled to an award of attorneys' fees and court costs for bringing this action.

**COUNT IX:**  
**UNFAIR COMPETITION UNDER § 43 OF THE LANHAM ACT**

112. TPO re-alleges and incorporates the preceding Paragraphs as if fully restated and set forth herein.

113. As mentioned, at various times between late 2015 and early 2016, John L. Raineri, District Sales Manager for ERMI/ERMI Inc. in Florida, made false, disparaging, and defamatory statements to actual and potential customers of TPO, including but not limited to representatives of the VA. These statements include but are not limited to statements such as "don't you know that there is a lawsuit against T-REX because the patient was injured using T-REX."

114. These statements are literally false. EMRI, ERMI Inc., and their sales representative knew these statements were not true at the time they made the statements.

115. Upon information and belief, EMRI, ERMI Inc., and Thomas Branch have made other literally false and/or misleading statements about Defendants, Defendants' products and services, and the Accused Device.

116. EMRI and ERMI Inc.'s false and/or misleading statements deceived, or had the capacity to deceive, consumers. The deception had a material effect on purchasing decisions because, *inter alia*, TPO lost all of its business with VA (and has not been able to provide home medical equipment to any VA patient) as a result of EMRI and ERMI Inc.'s false statements.

117. The misrepresented product or service affects interstate commerce.

118. TPO has been injured and is likely to be further injured as a result of EMRI and ERMI Inc.'s false and misleading statements.

### **JURY DEMAND**

OneDirect Health Network, Inc., on its own behalf and on behalf of all of its distributors who have been or may be sued by ERMI, LLC, as well as Team Post Op, Inc., hereby demand a trial by jury on all issues so triable.

### **PRAAYER FOR RELIEF**

WHEREFORE, OneDirect Health Network, Inc., on its own behalf and on behalf of all of its distributors who have been or may be sued by ERMI, LLC, as well as Team Post Op, Inc., pray that this Court to enter an Order in their favor and

against ERMI LLC, ERMI Inc. and Thomas Branch including, but not limited to:

- A. A declaratory judgment that none of OneDirect Health Network, Inc., its distributors, or Team Post Op, Inc.'s products infringe or have infringed, either directly or indirectly, or contributorily, any valid Asserted Claim of the '289 Patent;
- B. A declaratory judgment that the Asserted Claims of the '289 Patent are invalid;
- C. A declaratory judgment that the '289 Patent is unenforceable;
- D. A declaration that this case is exceptional under 35 USC § 285 and awarding OneDirect Health Network, Inc., its distributors, and Team Post Op, Inc. their attorney's fees, costs, and expenses incurred in this action;
- E. Damages for tortious interference, false advertising, and other inappropriate conduct, including attorney's fees, costs, interest, and expenses, and injunctive relief precluding EMRI, ERMI, Inc. and/or Thomas Branch from engaging in such conduct;
- F. An award of compensatory damages against ERMI to compensate OneDirect Health Network, Inc., its distributors, and Team Post Op, Inc. for their losses;

- G. An award of uncapped punitive damages in favor of OneDirect Health Network, Inc. against ERMI in an amount to be determined by the enlightened conscience of an impartial jury;
- H. All actual damages in the form of lost profits sustained by Team Post Op, Inc. through the date of trial;
- I. An injunction enjoining ERMI from offering home medical equipment for sale or lease in Florida unless and until such time as it is in full compliance with ACHA; and,
- J. An award to OneDirect Health Network, Inc., its distributors, and Team Post Op, Inc. of such further relief at law or in equity as the Court deems just and proper.

Dated: January 24, 2020

*/s/Randy Edwards*

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*Attorneys for Defendants/Counterclaimants*

## **Exhibit A**



US007547289B2

(12) **United States Patent  
Branch**

(10) **Patent No.:** US 7,547,289 B2  
(45) **Date of Patent:** Jun. 16, 2009

(54) **SHOULDER EXTENSION CONTROL DEVICE**(75) Inventor: **Thomas P. Branch**, Atlanta, GA (US)(73) Assignee: **ERMI Corporation**, Decatur, GA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 451 days.

(21) Appl. No.: **10/318,988**(22) Filed: **Dec. 13, 2002**(65) **Prior Publication Data**

US 2003/0130600 A1 Jul. 10, 2003

**Related U.S. Application Data**

(60) Provisional application No. 60/341,371, filed on Dec. 13, 2001.

(51) **Int. Cl.****A61H 1/02** (2006.01)(52) **U.S. Cl.** ..... **601/5**; 601/26; 601/33(58) **Field of Classification Search** ..... 601/5, 601/23, 24, 26, 33, 40, 34, 35

See application file for complete search history.

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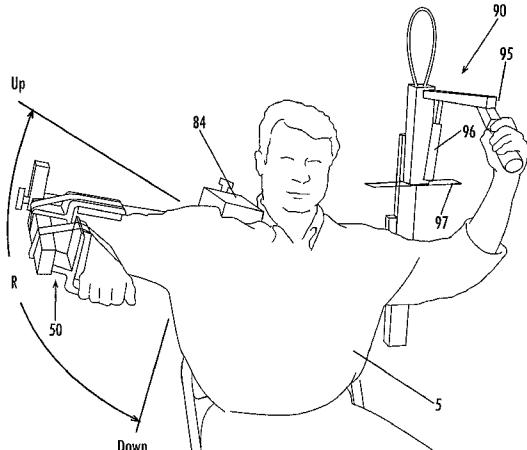
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(Continued)

*Primary Examiner*—Danton DeMille(74) *Attorney, Agent, or Firm*—Alston & Bird LLP(57) **ABSTRACT**

Methods and apparatuses for providing range of motion control devices, and particularly relates to an apparatus for providing control of the range of motion of a human shoulder.

**22 Claims, 28 Drawing Sheets**

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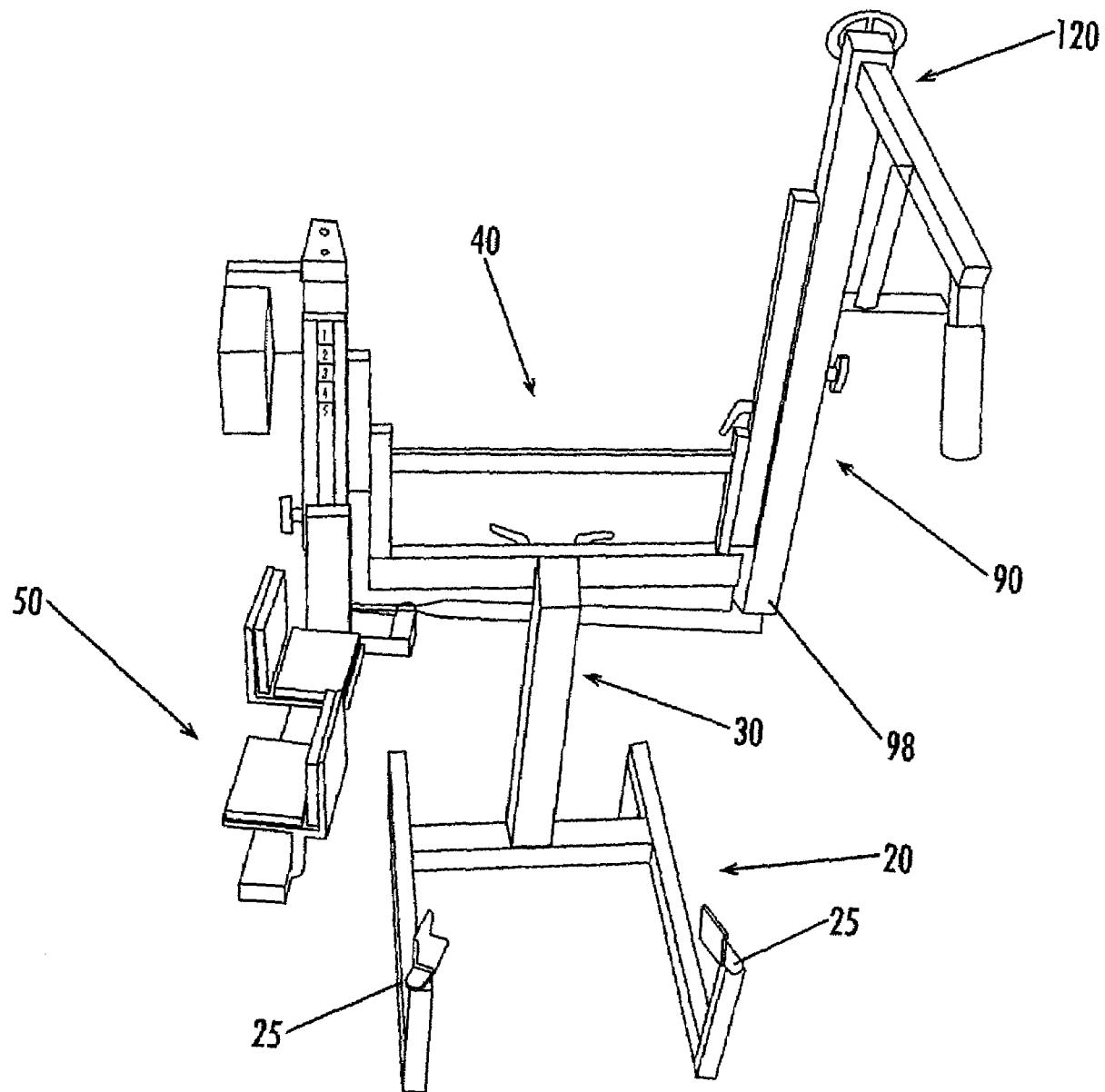


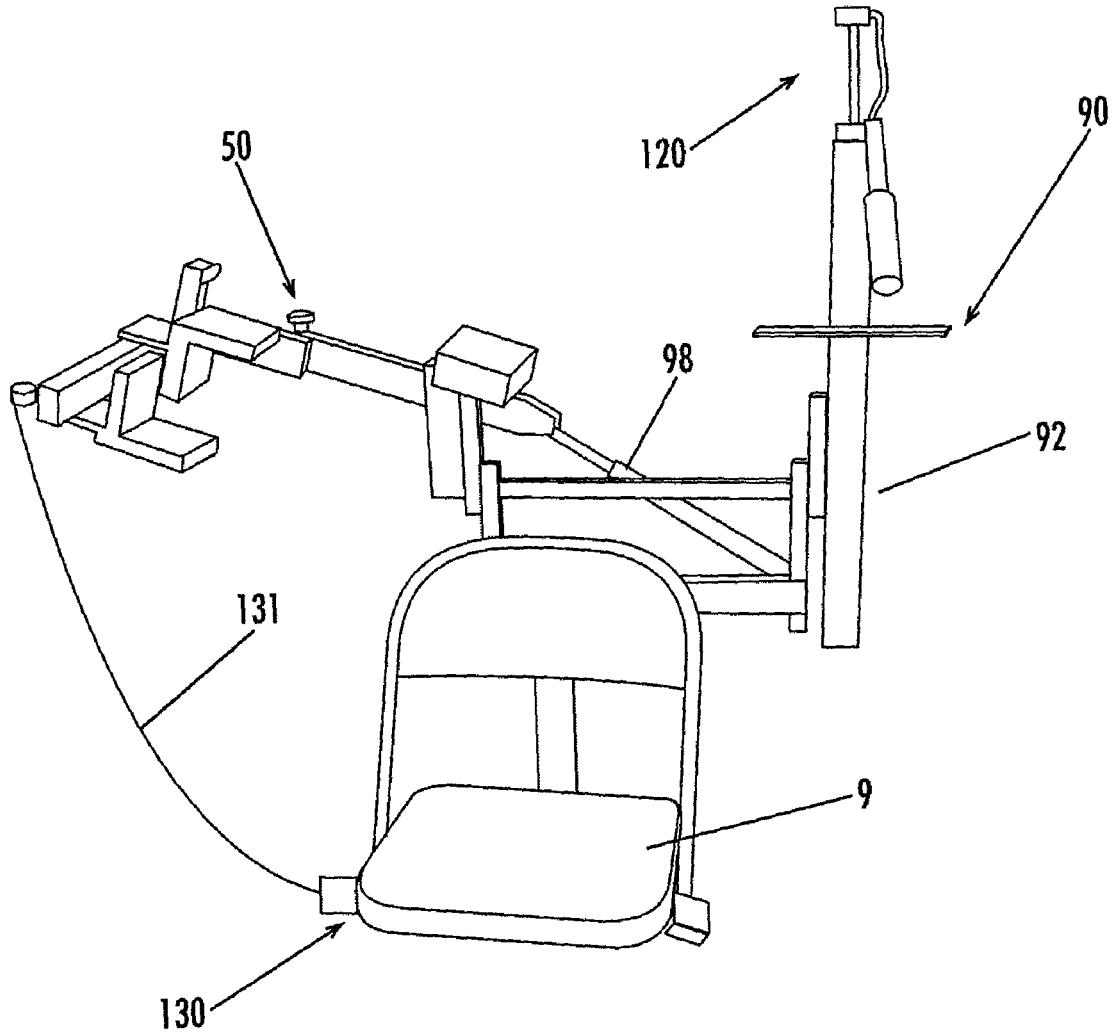
Fig. 1

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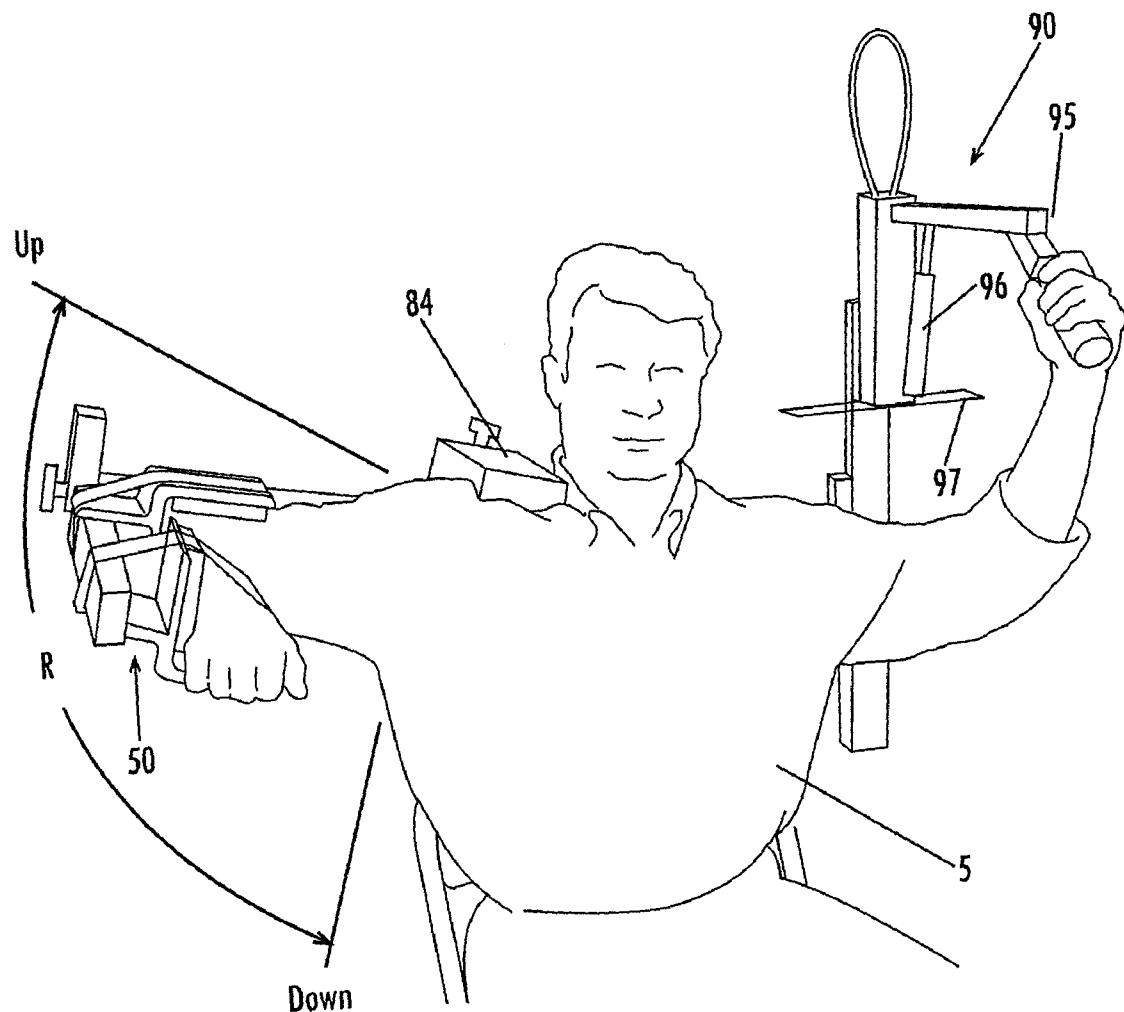
**Fig. 2**

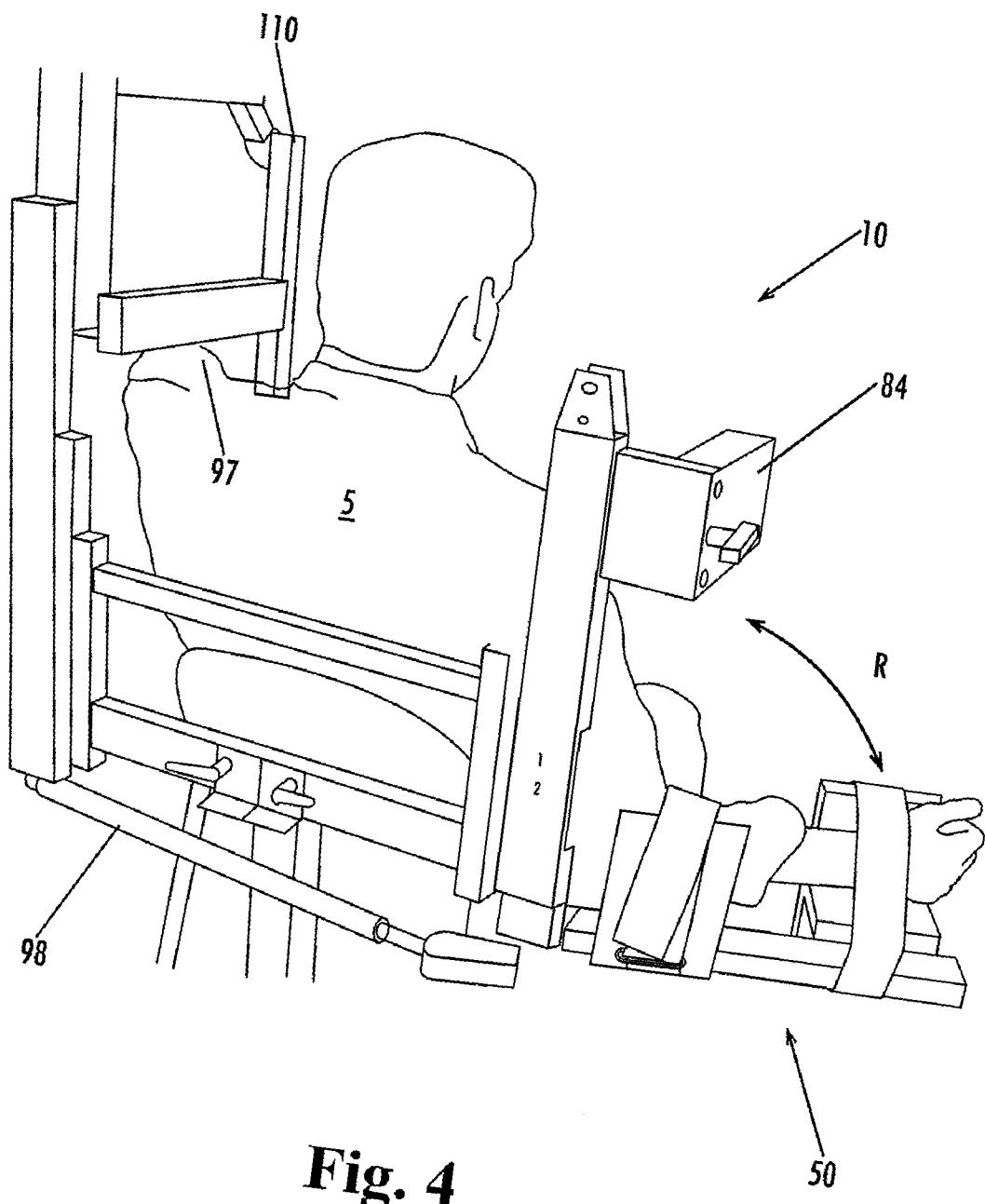
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**Fig. 3**



**Fig. 4**

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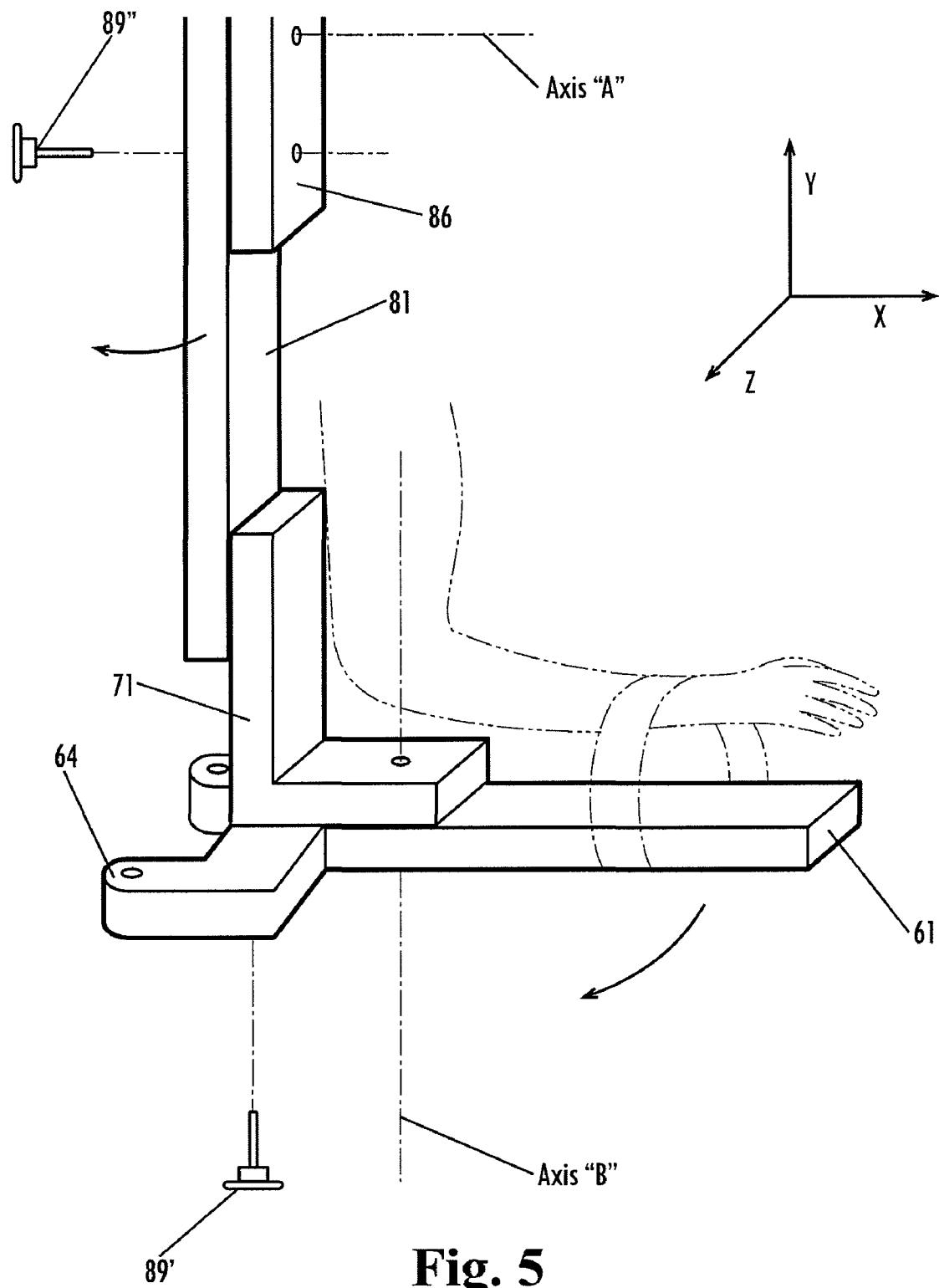


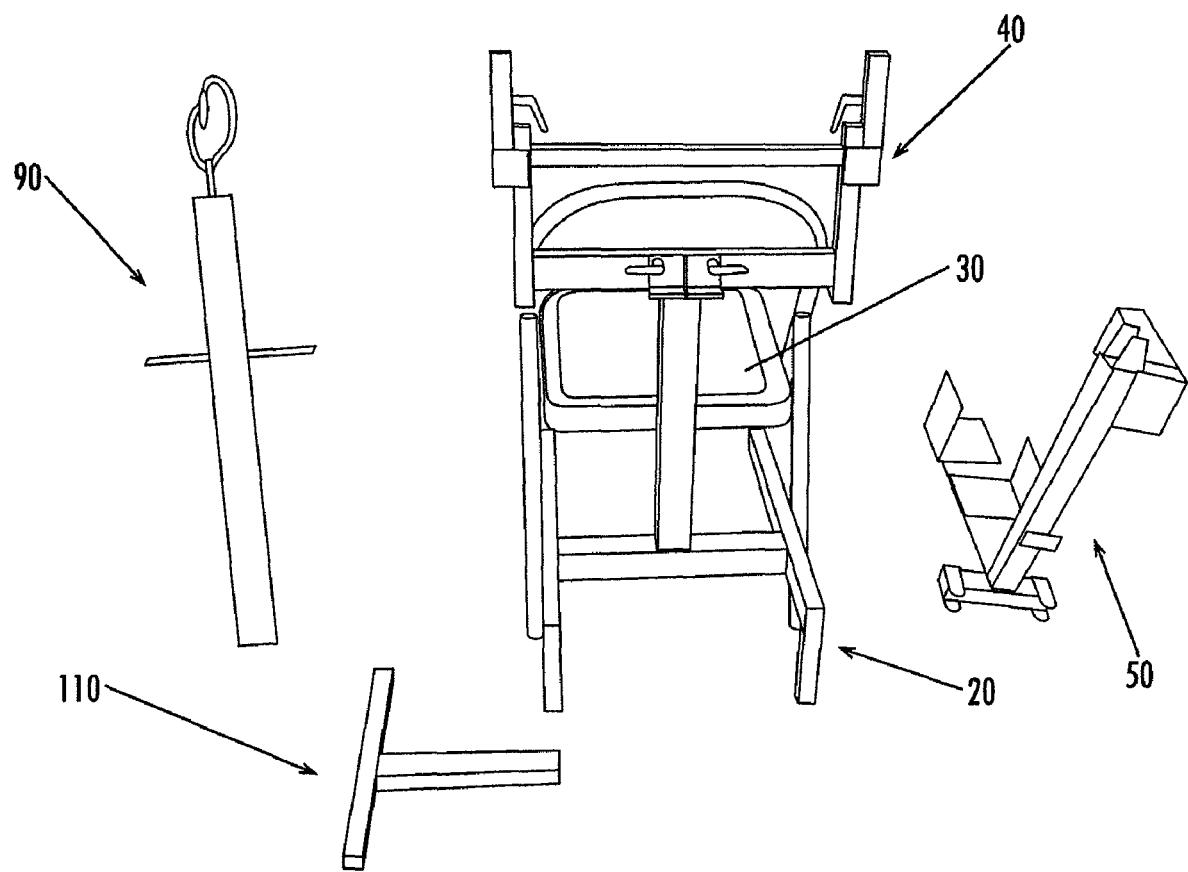
Fig. 5

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**Fig. 6**

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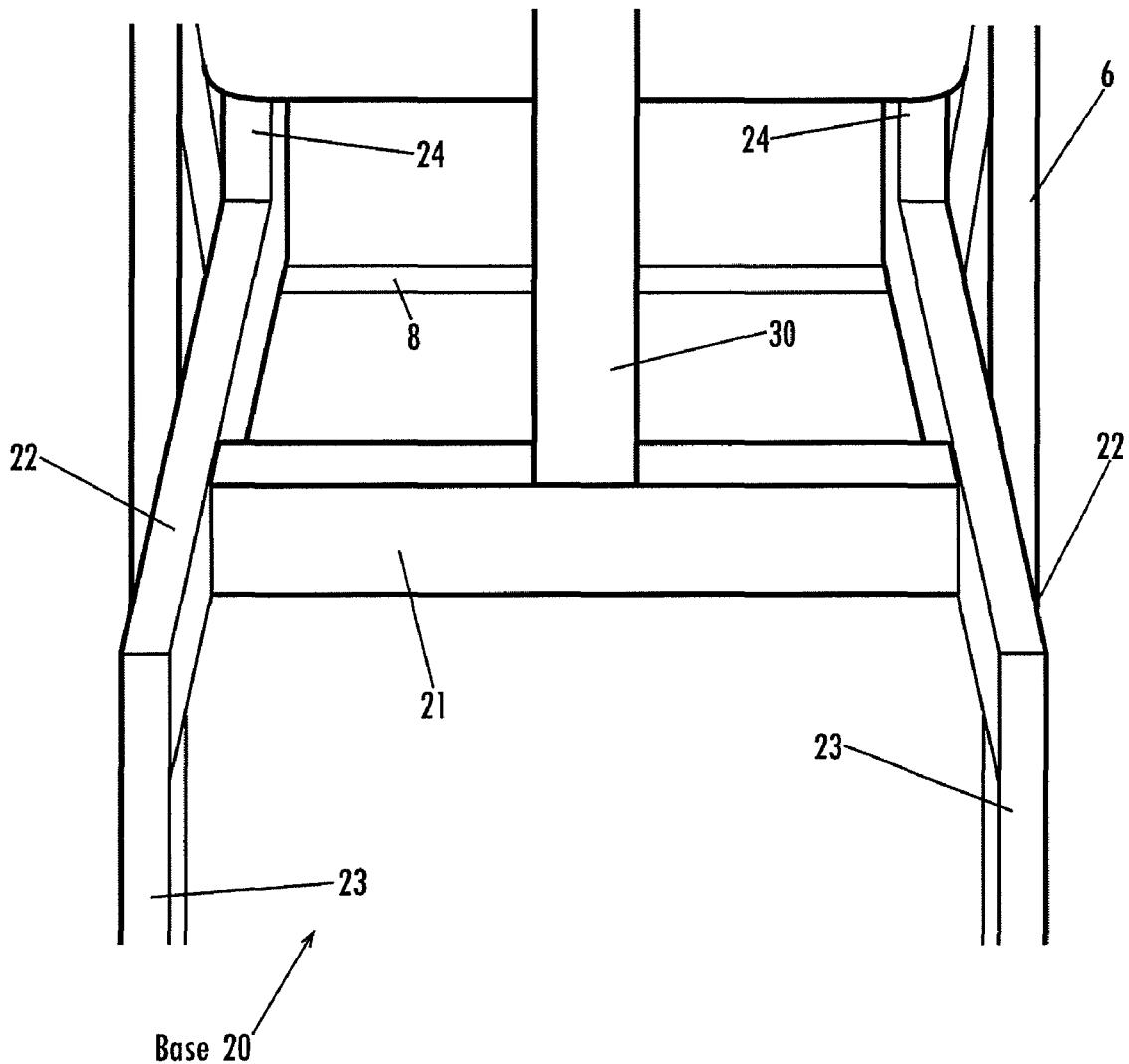


Fig. 7

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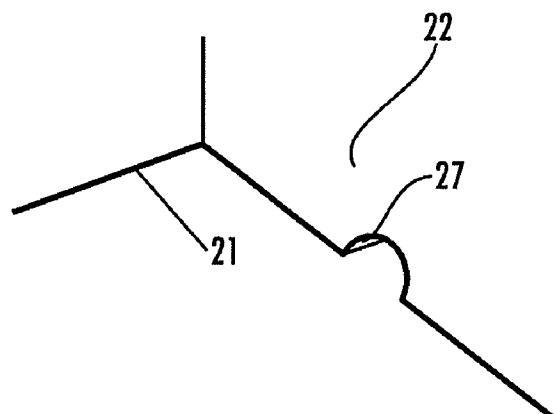


Fig. 8

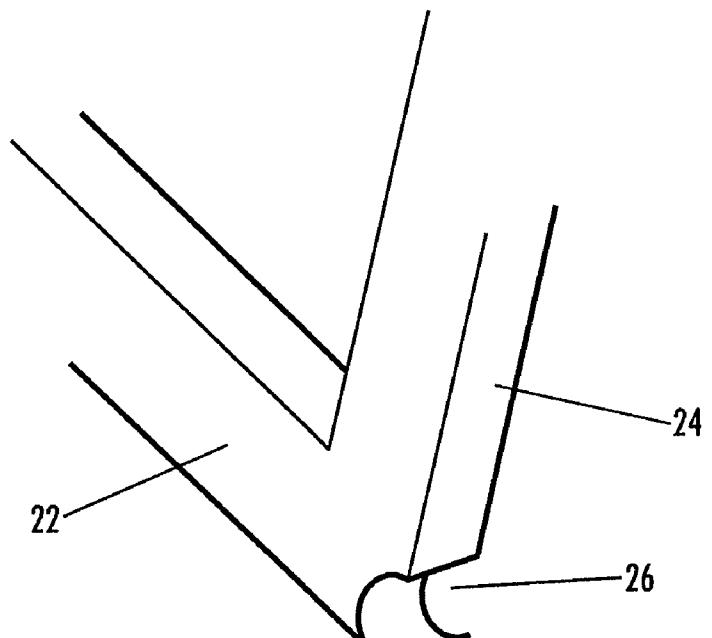
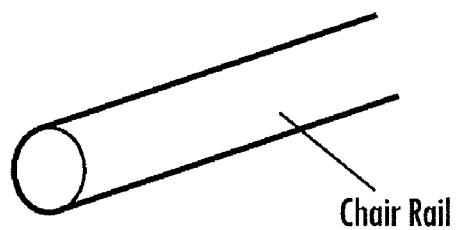
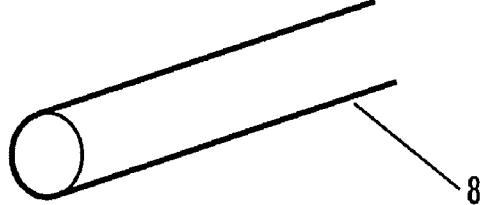


Fig. 9

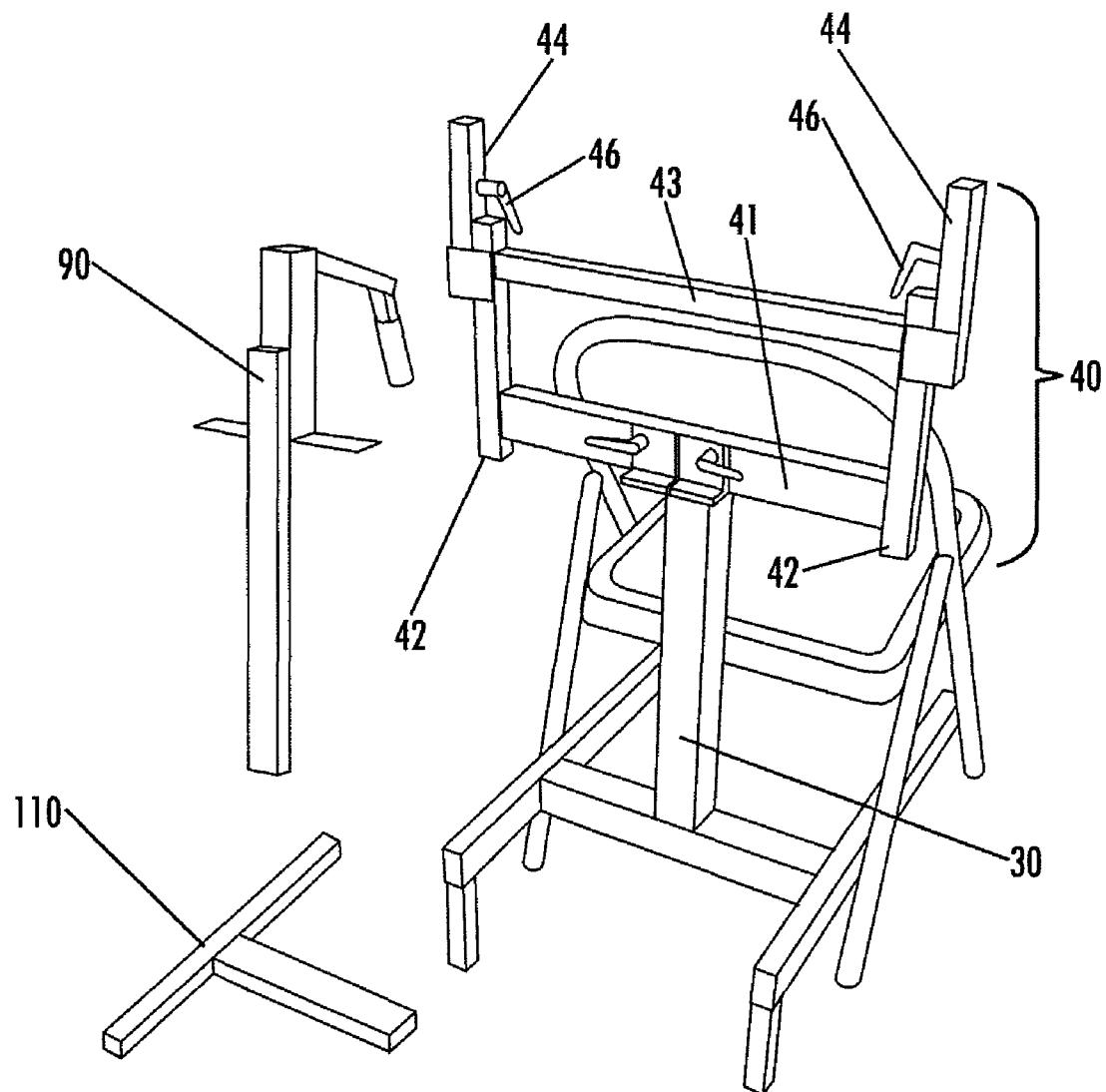


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**Fig. 10**

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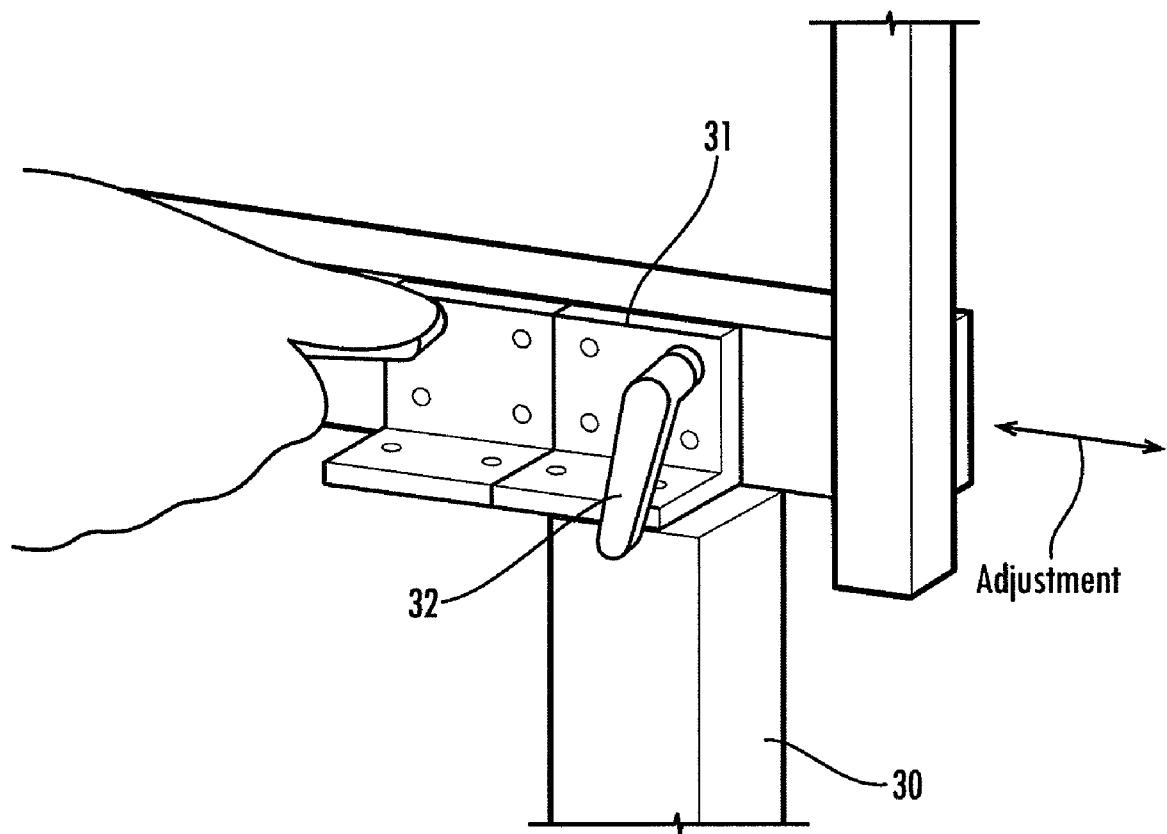


Fig. 11

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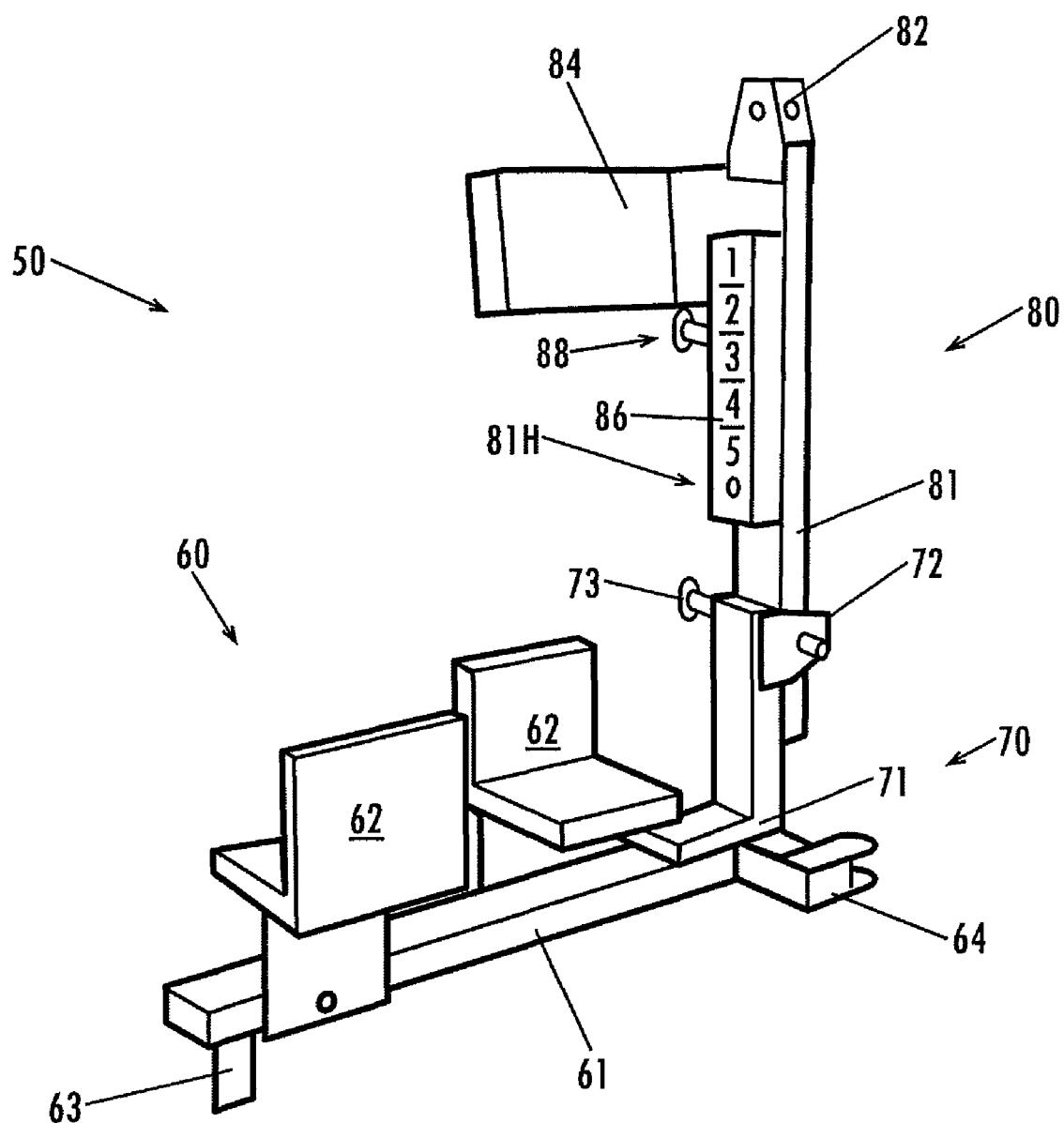


Fig. 12

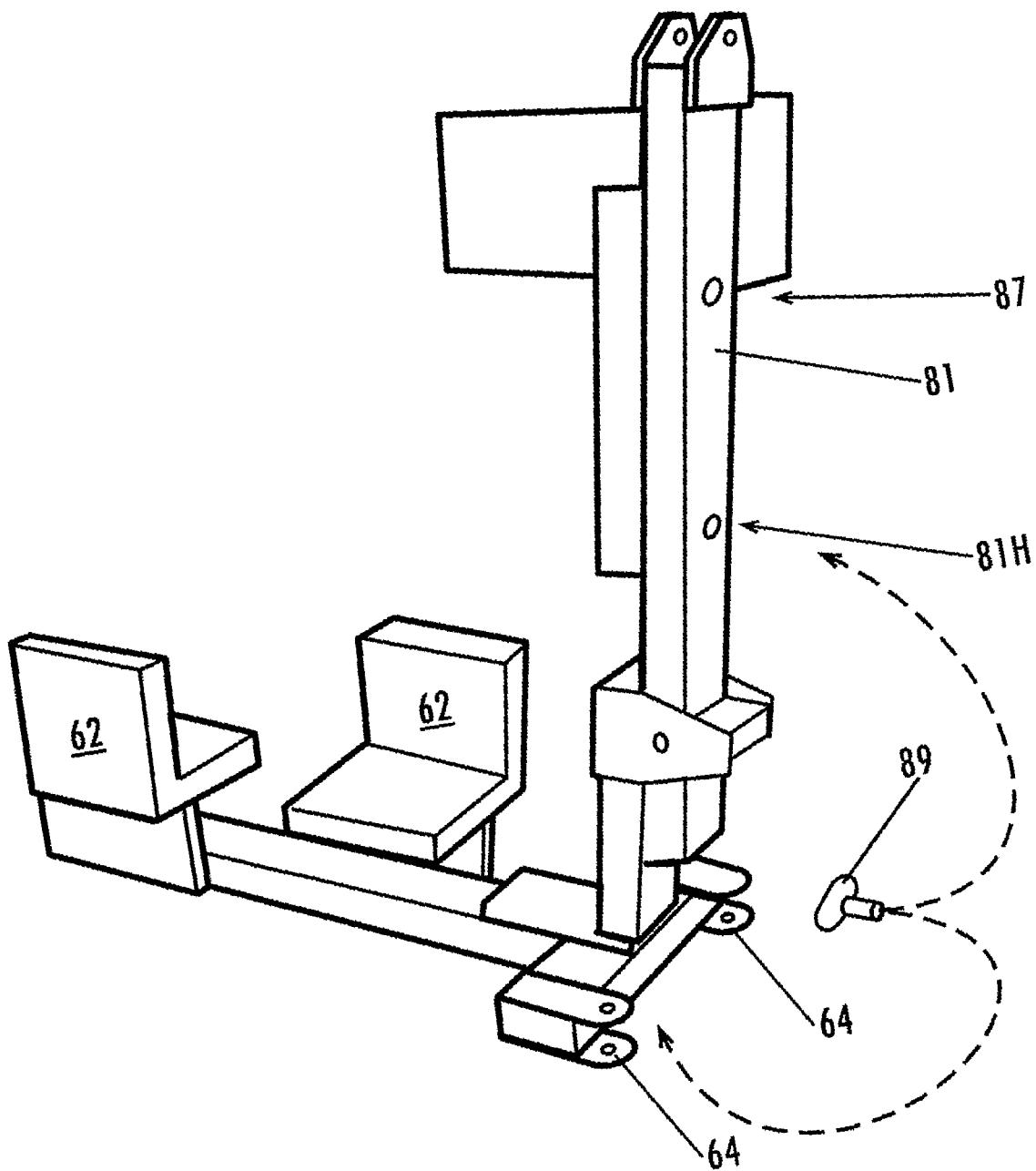


Fig. 13

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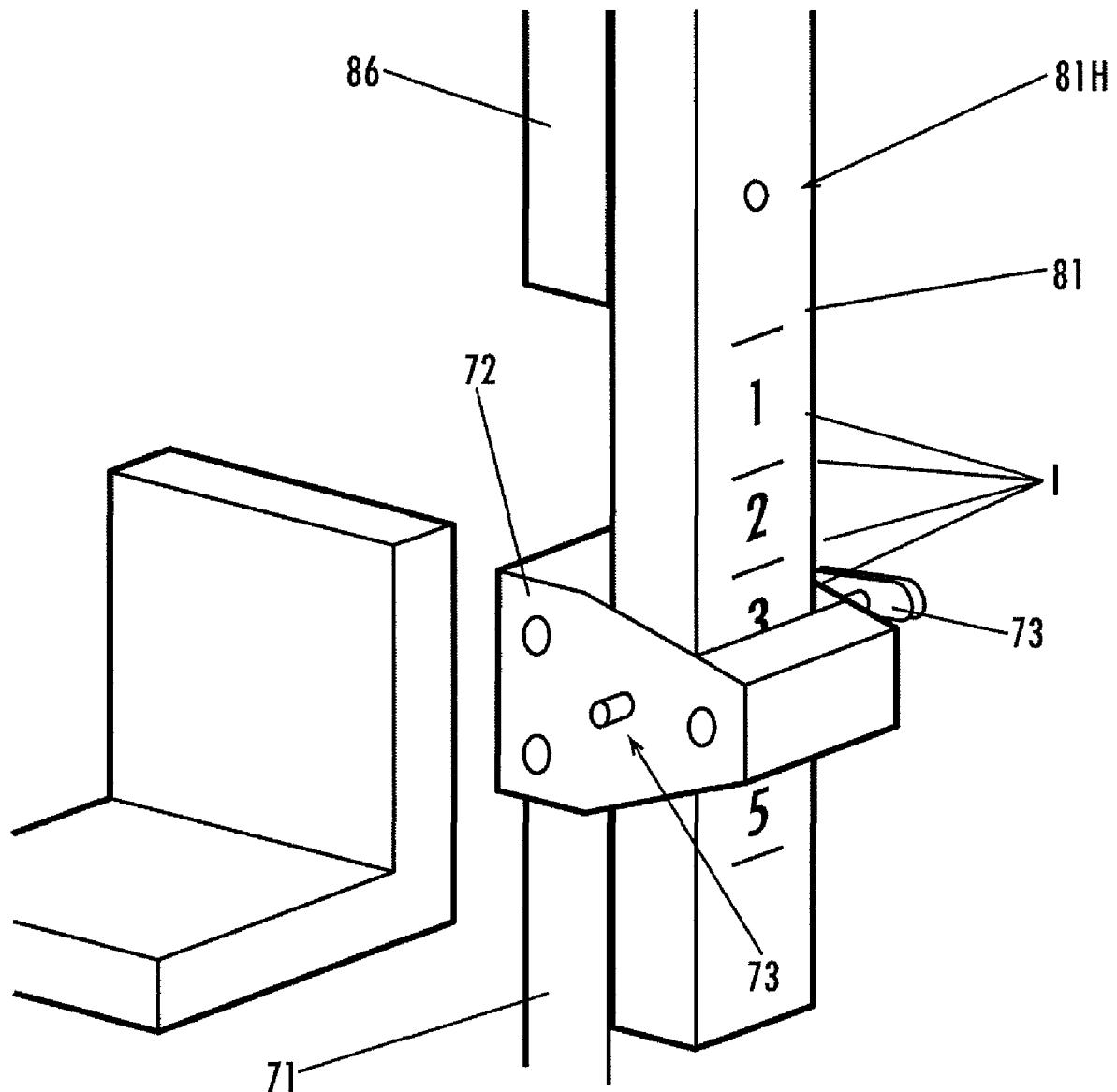


Fig. 14

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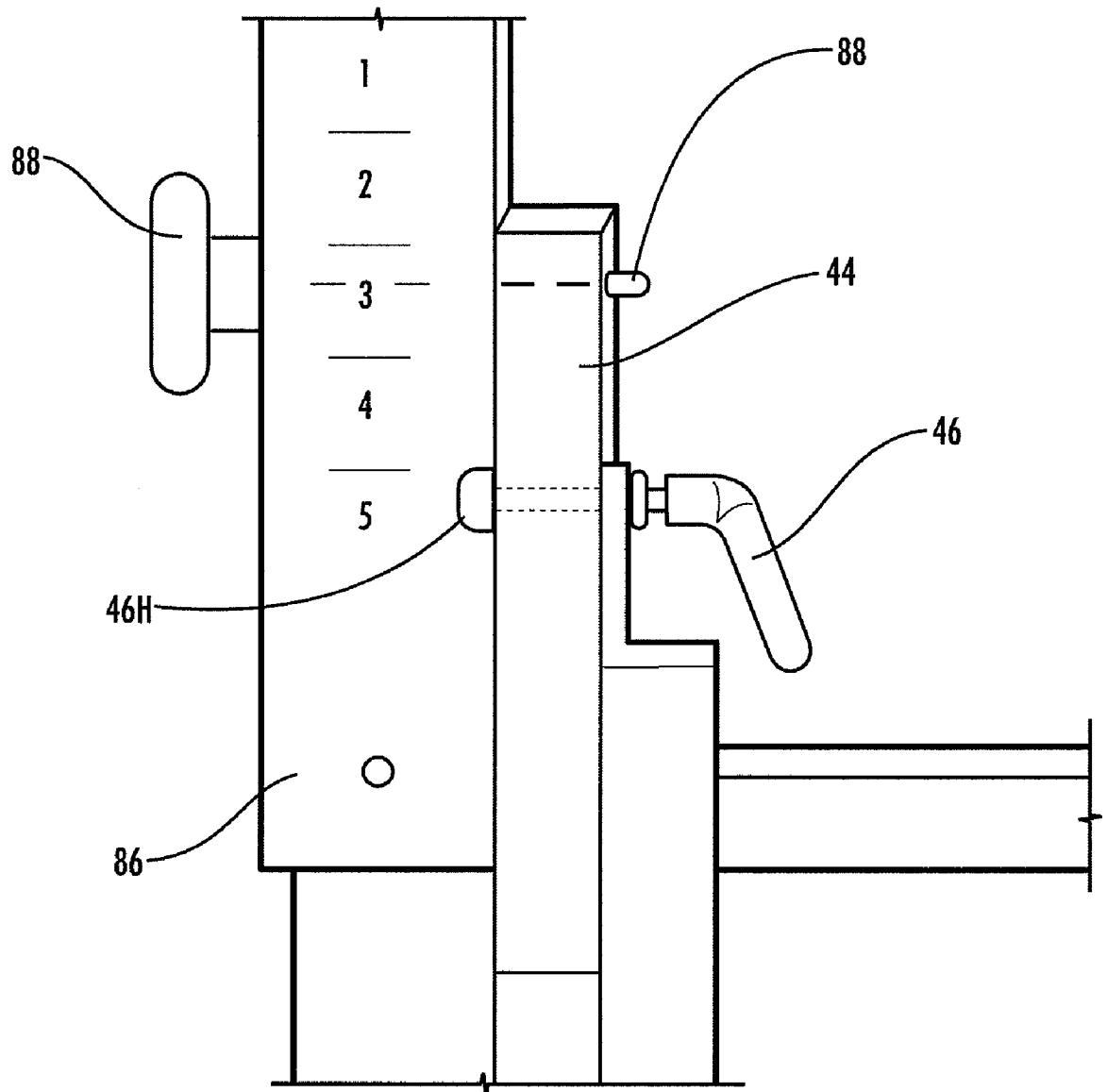
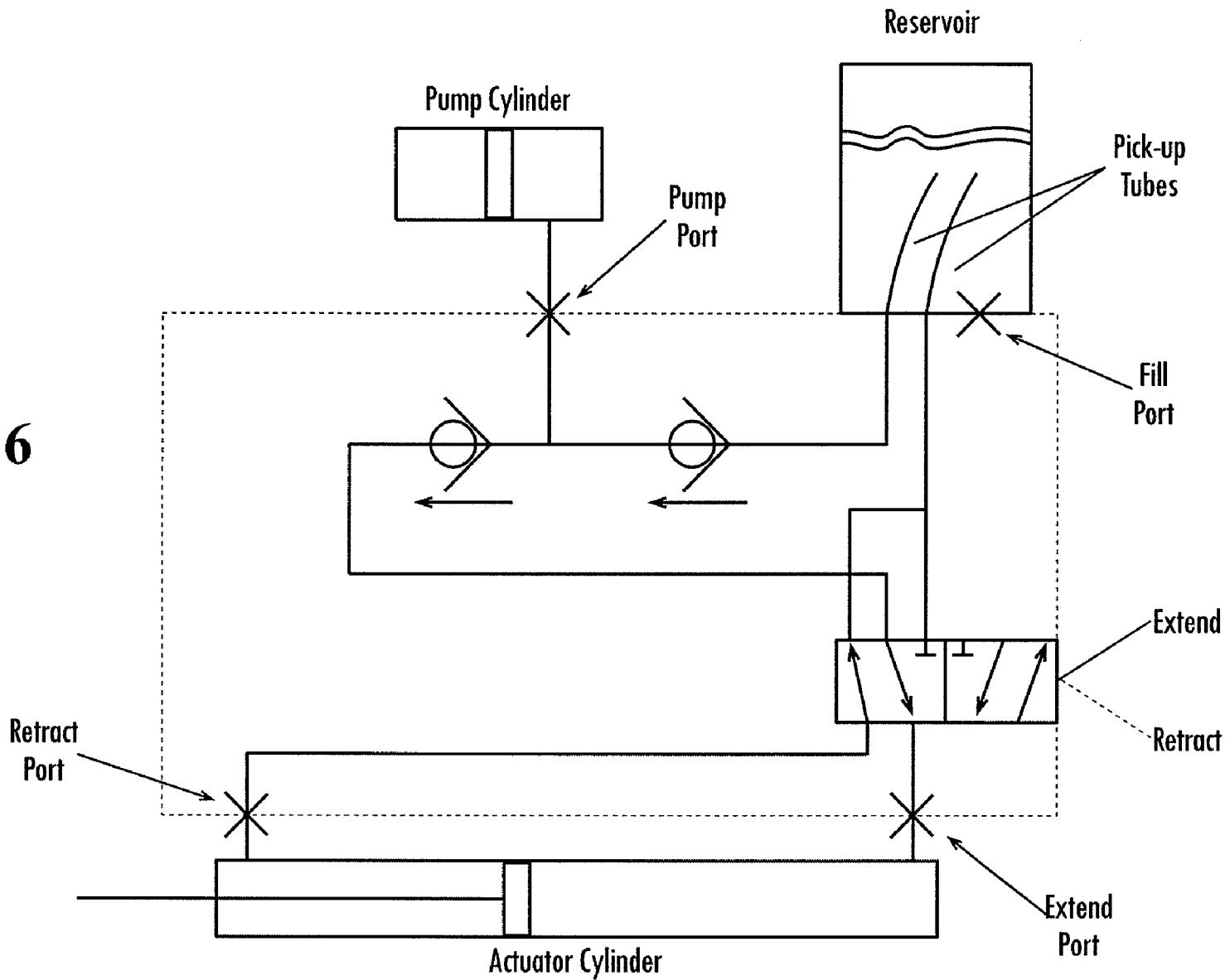


Fig. 15

Fig. 16



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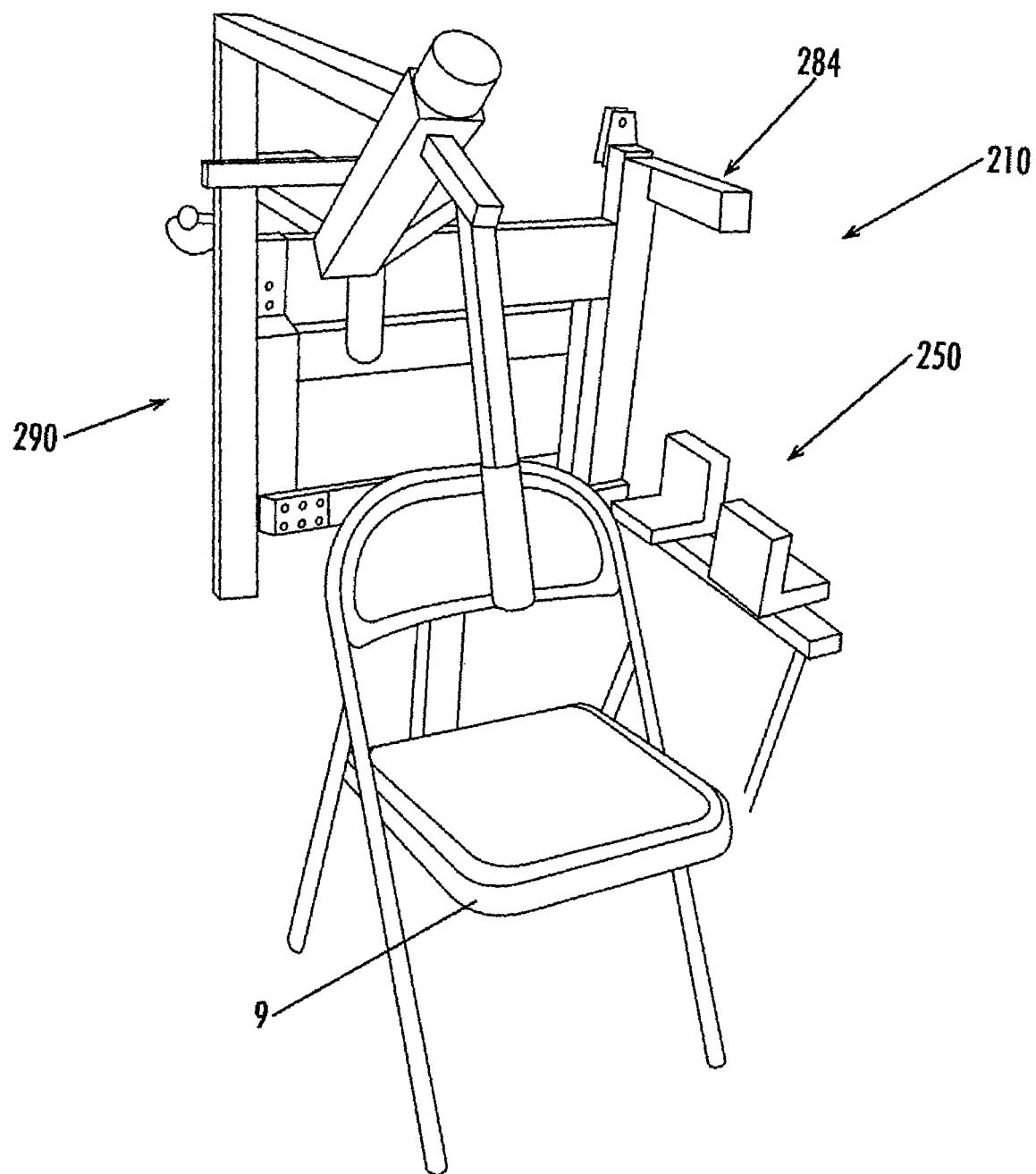


Fig. 17

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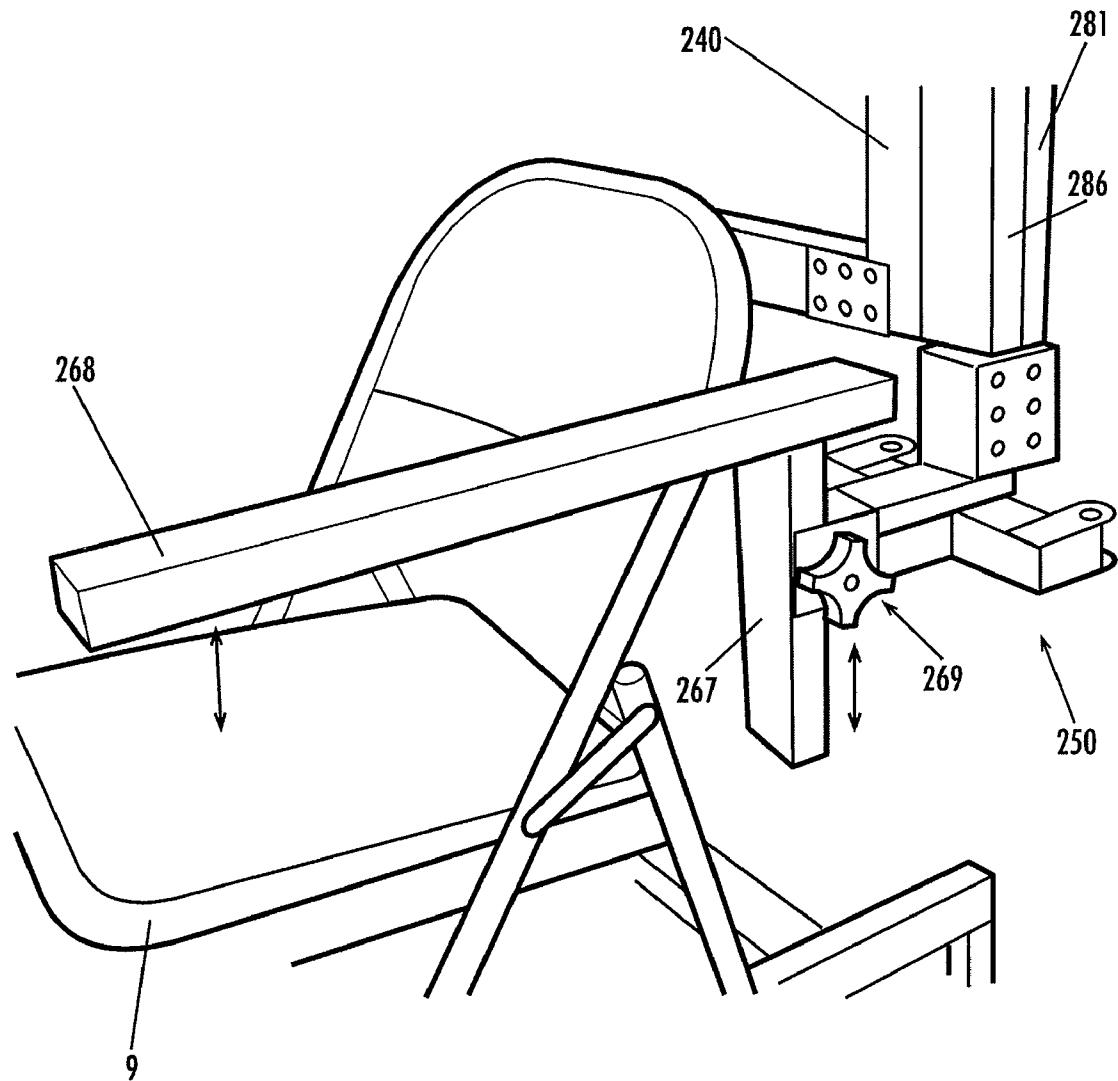


Fig. 18

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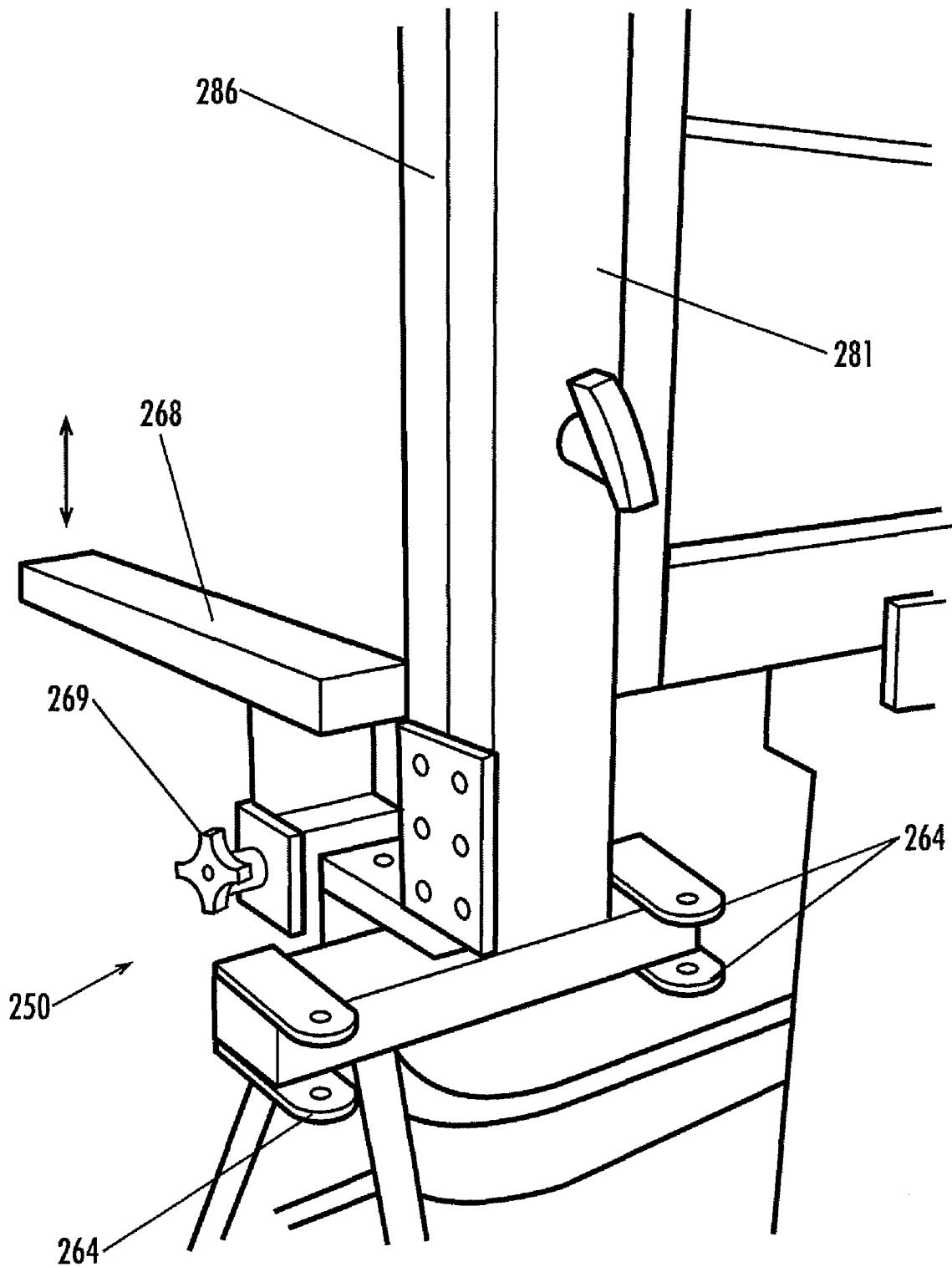
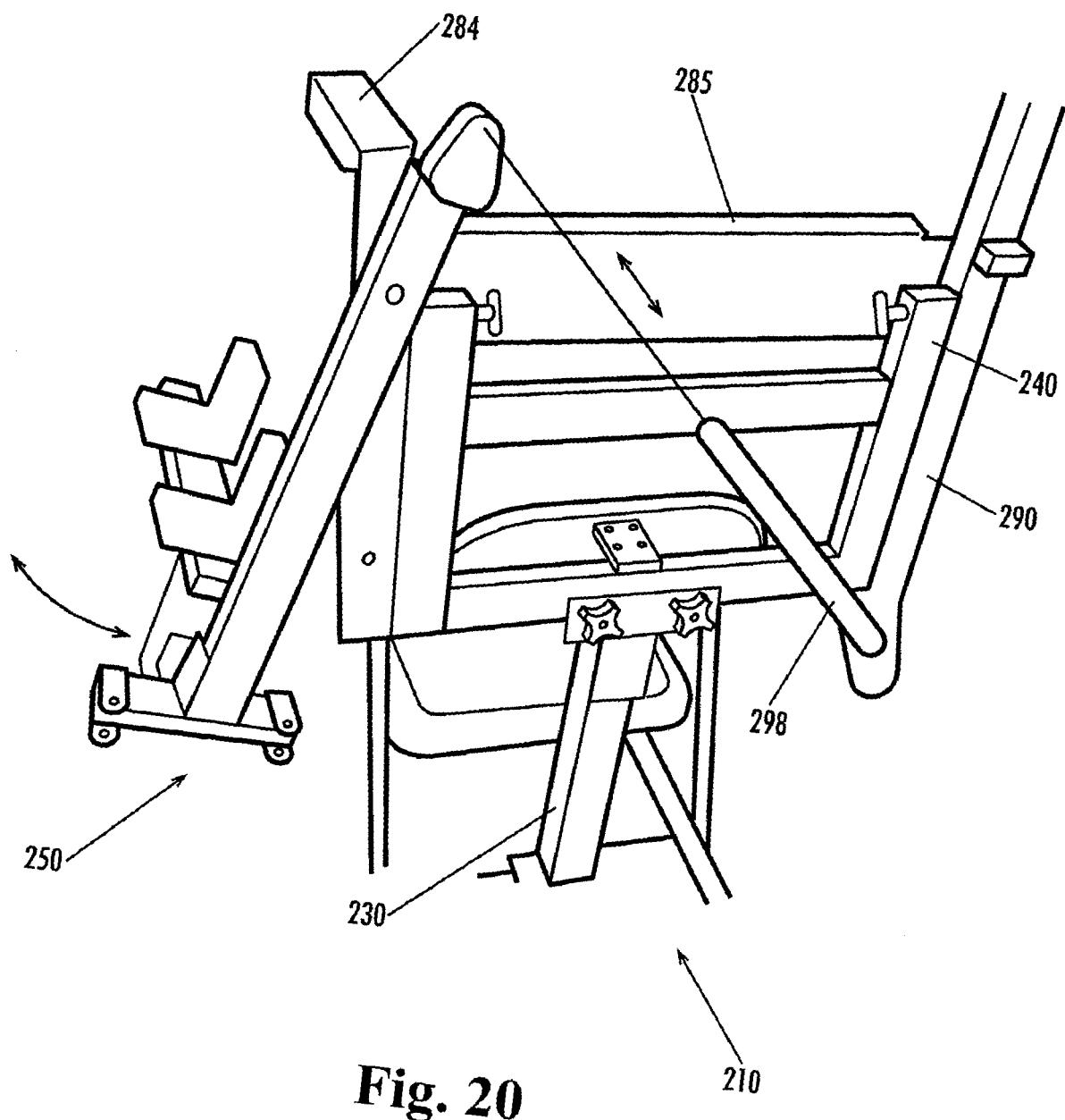
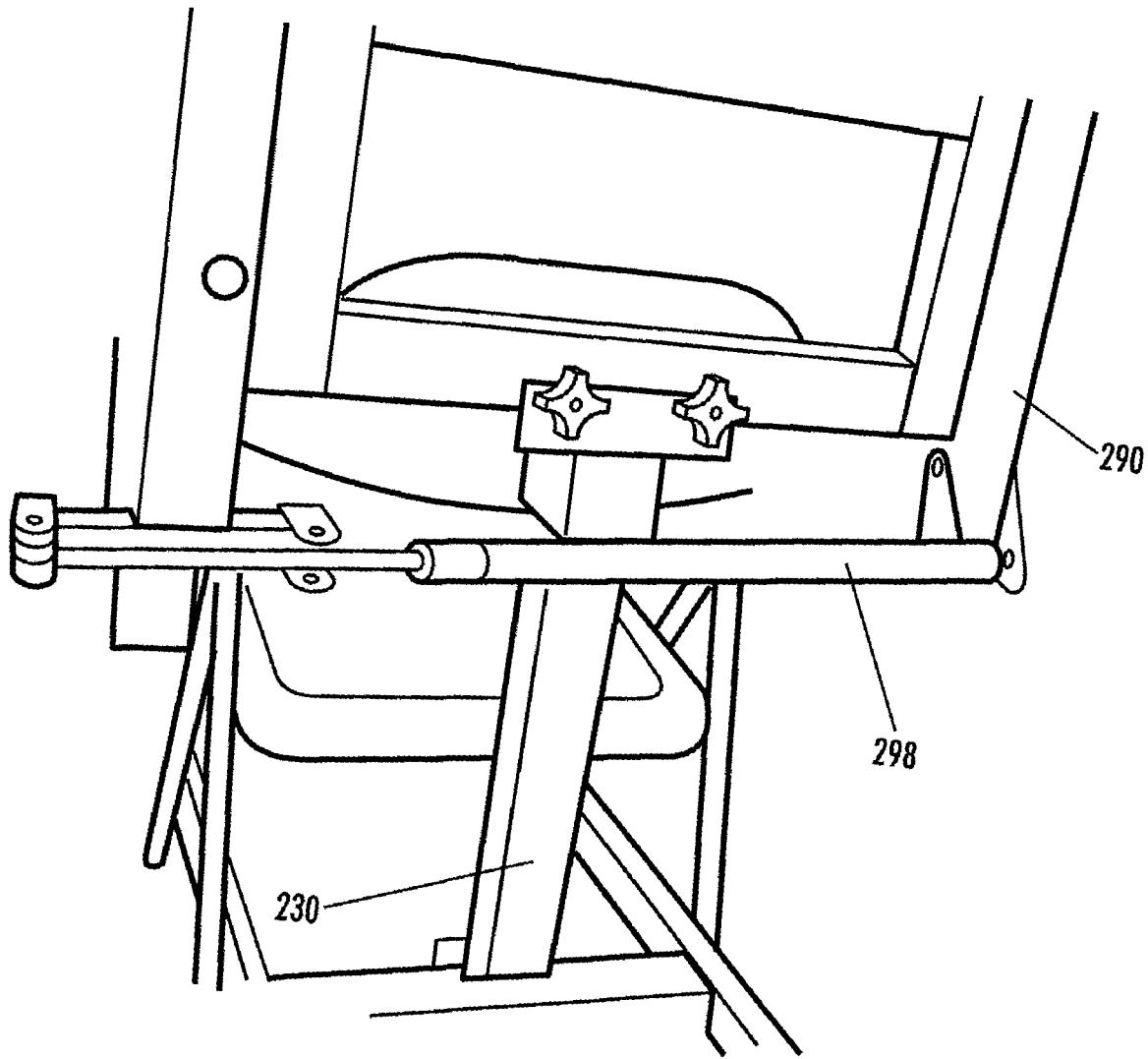


Fig. 19





**Fig. 21**

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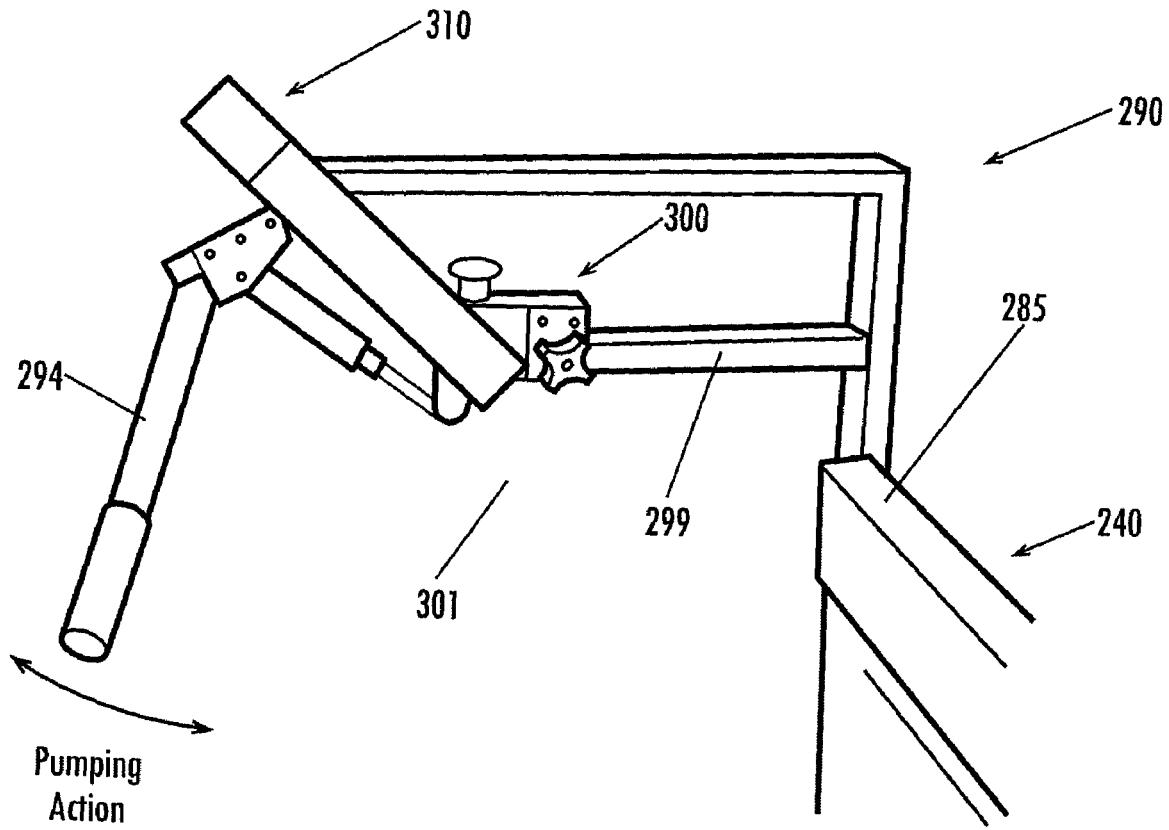


Fig. 22

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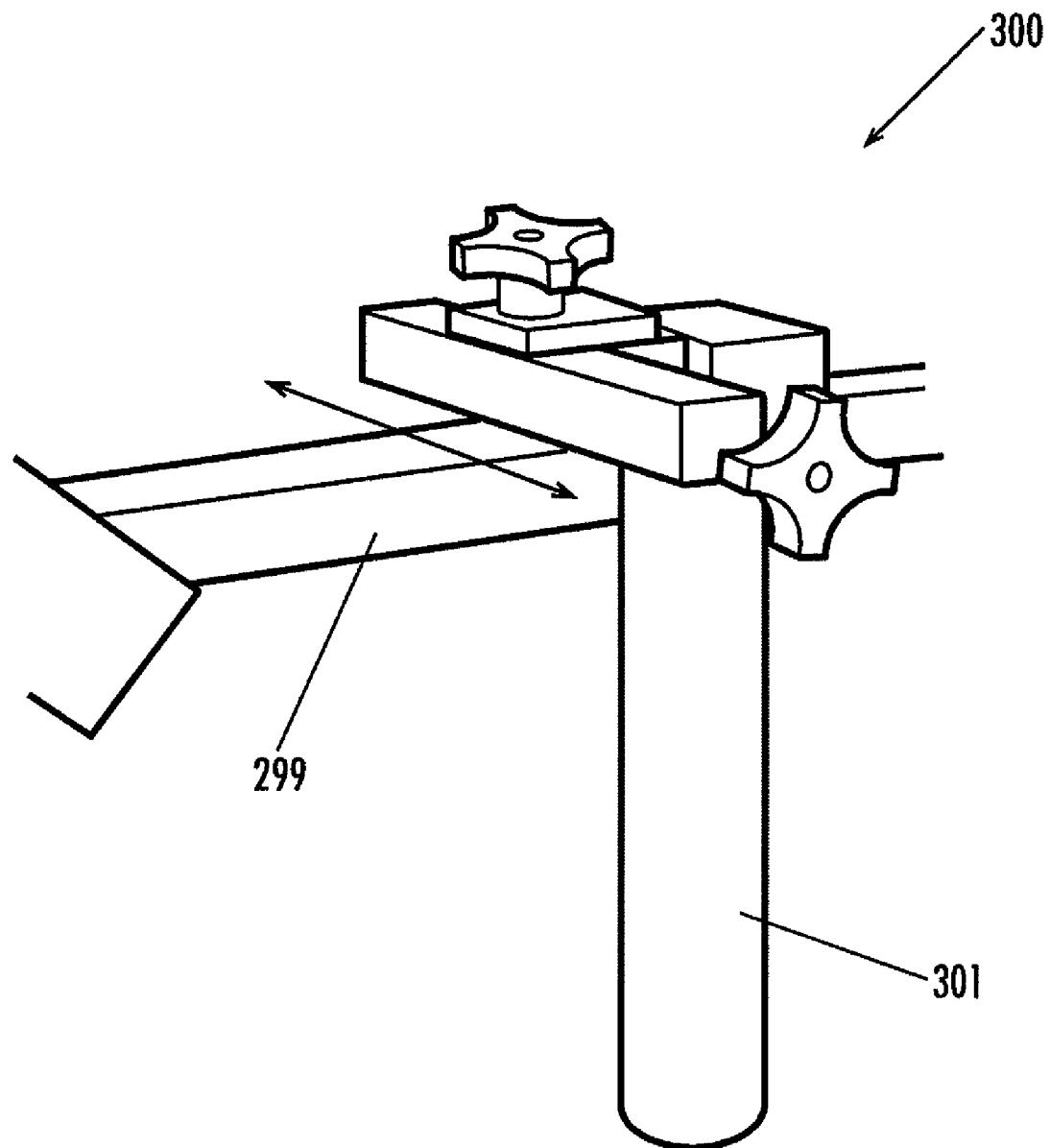


Fig. 23

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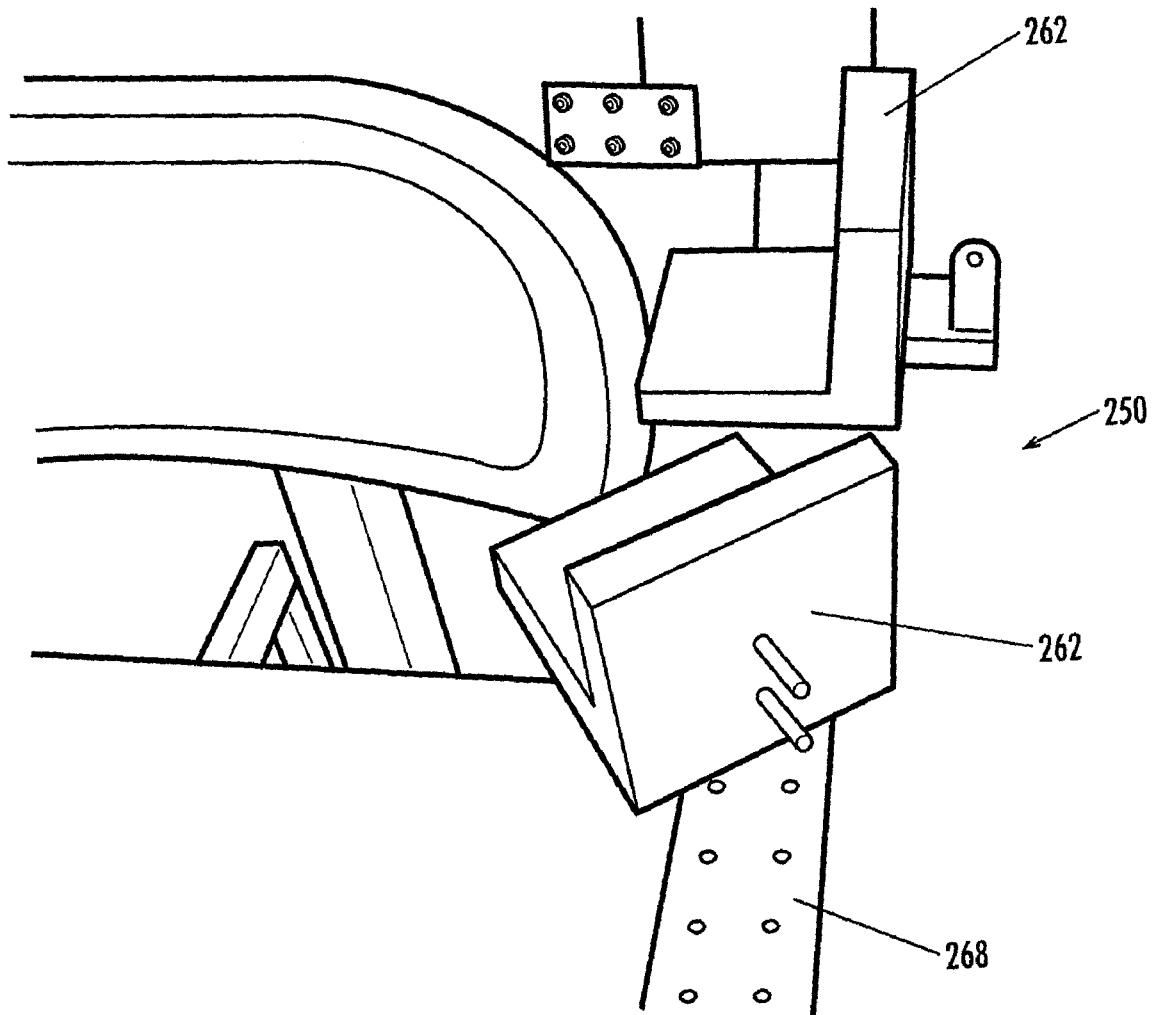


Fig. 24

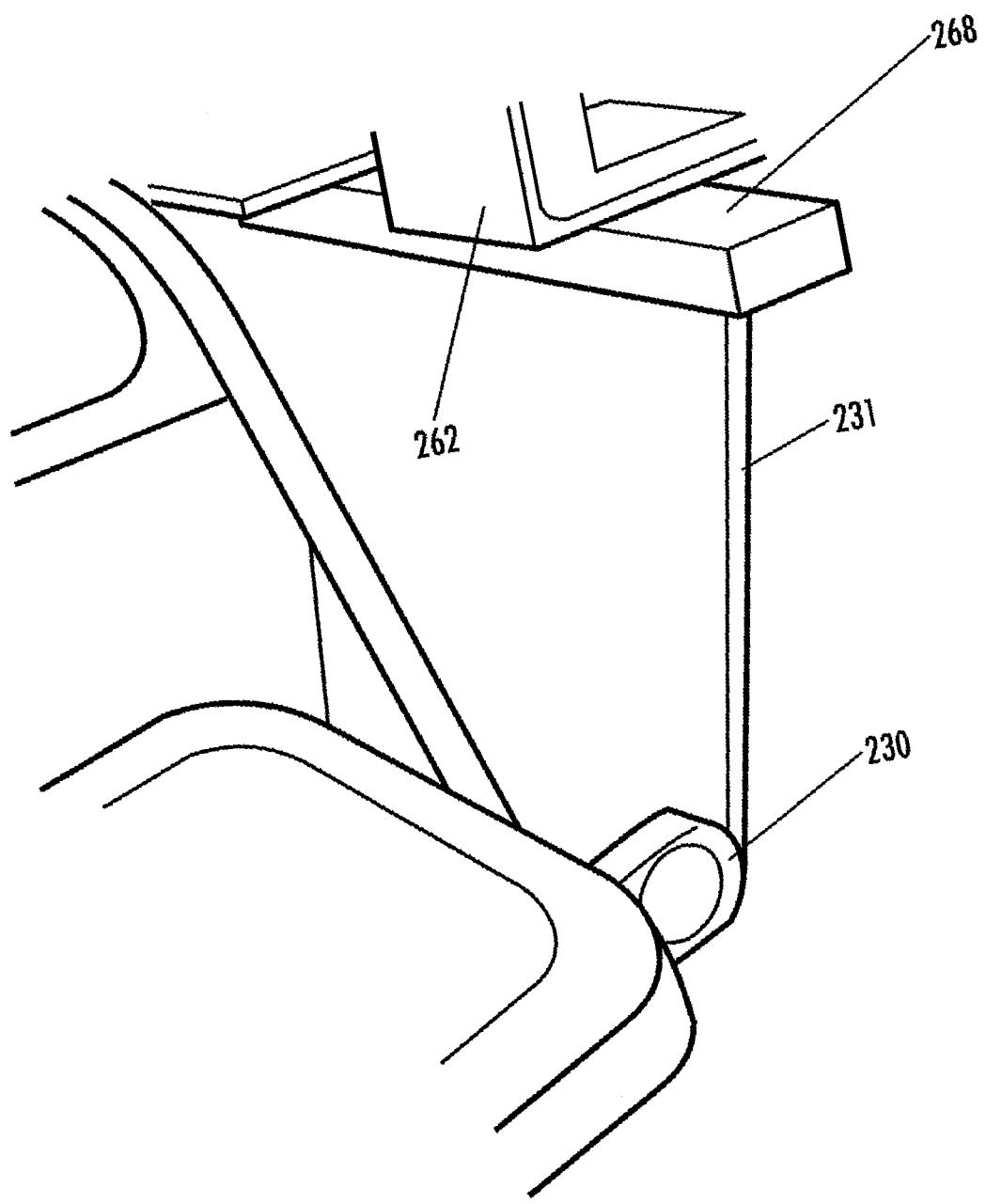


Fig. 25

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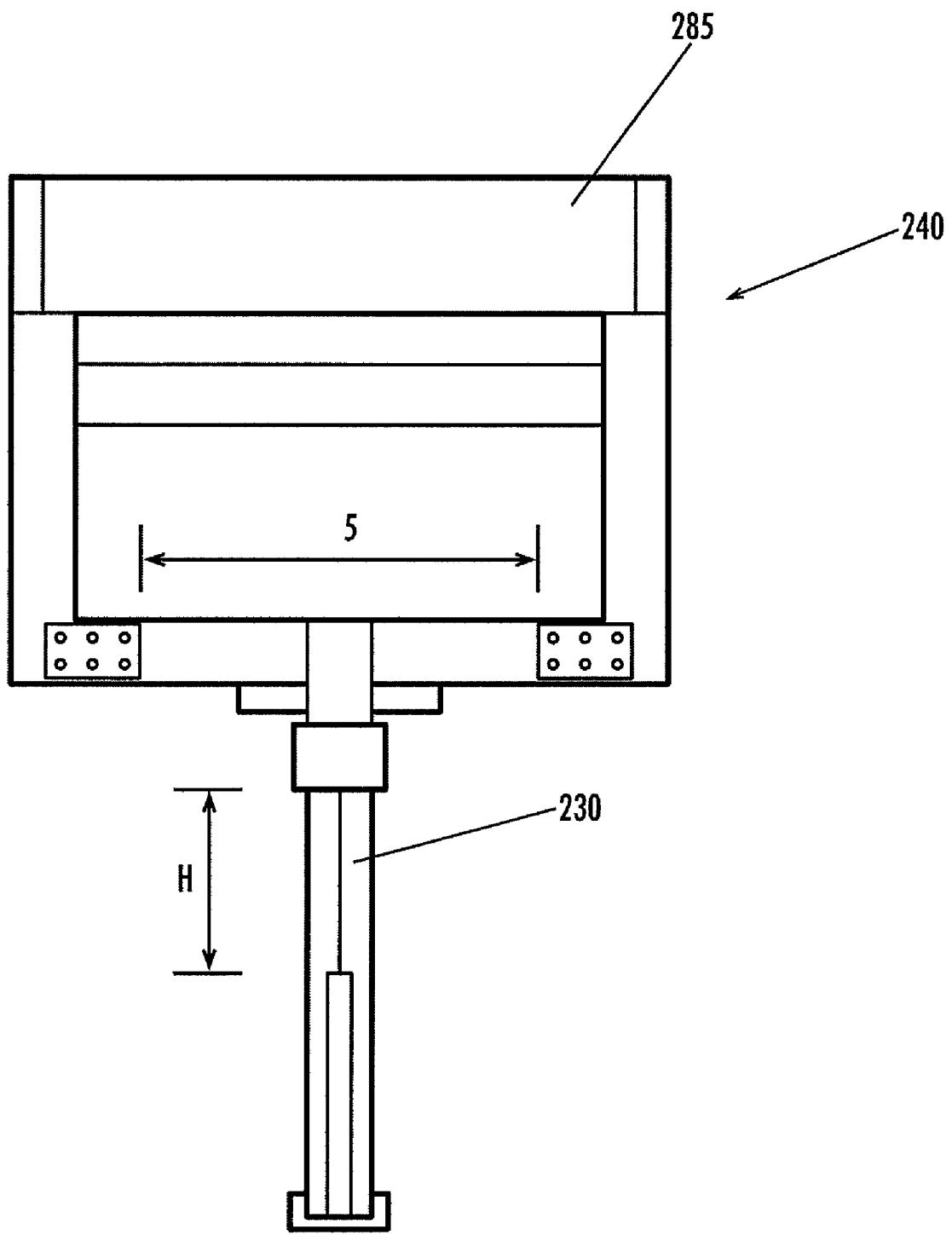


Fig. 26

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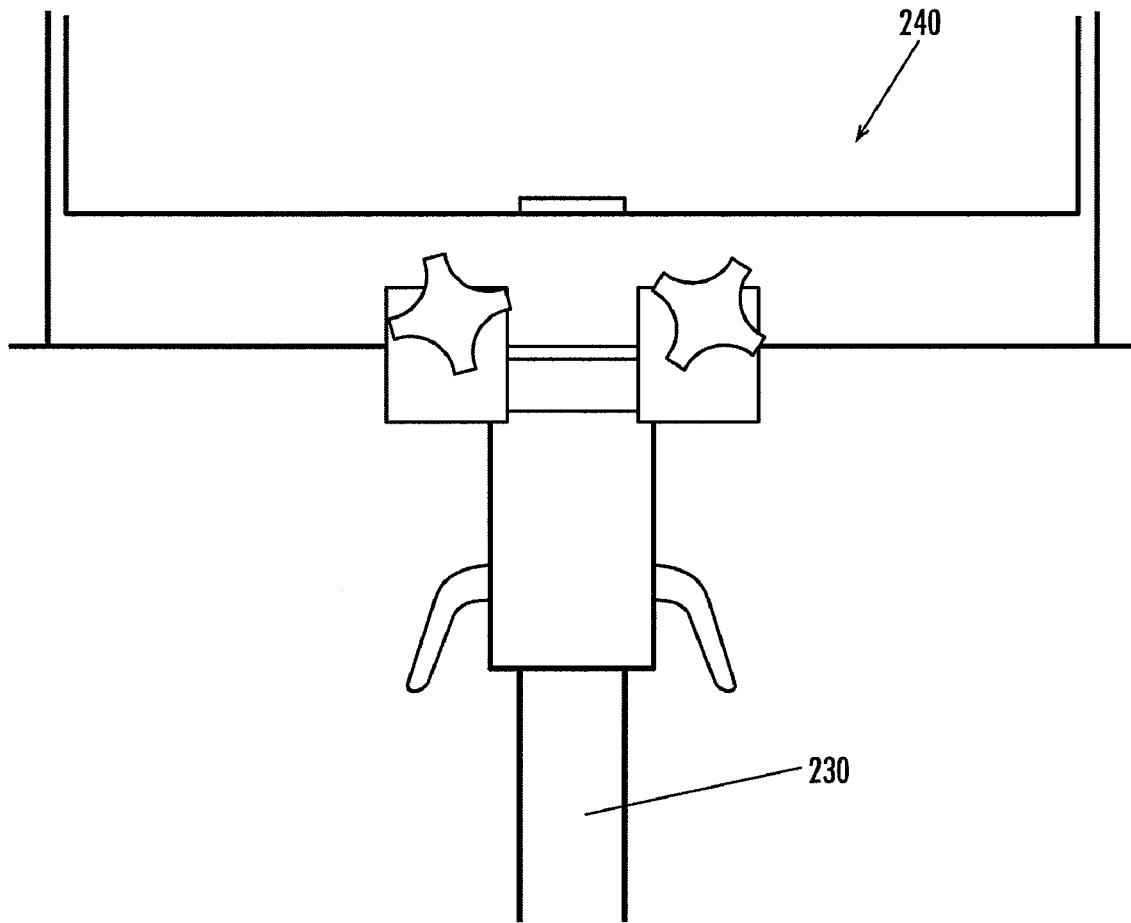


Fig. 27

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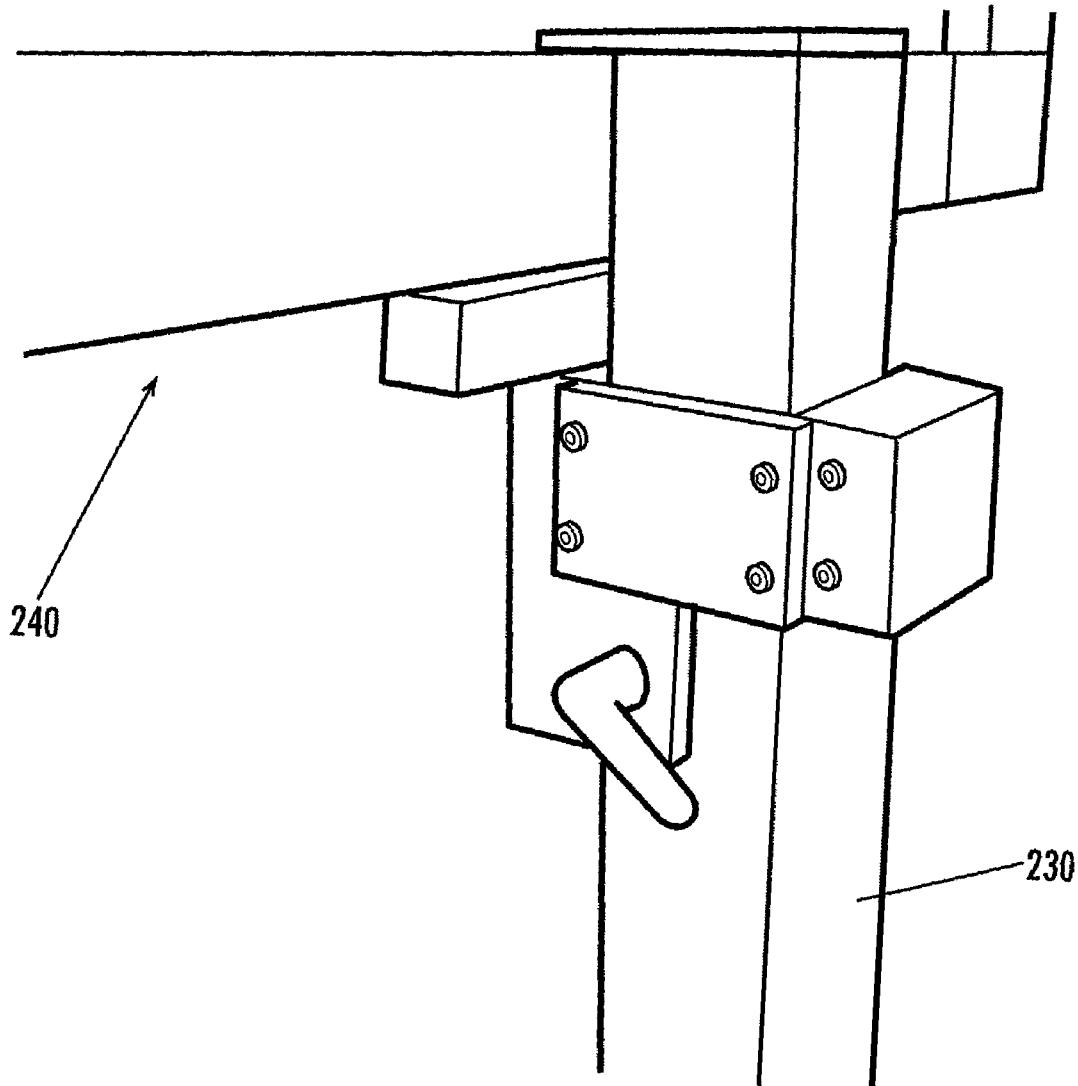


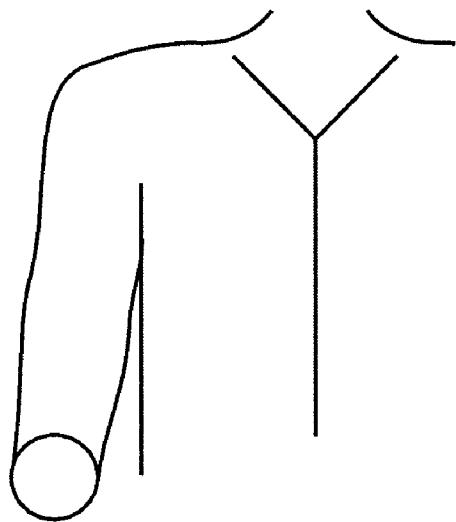
Fig. 28

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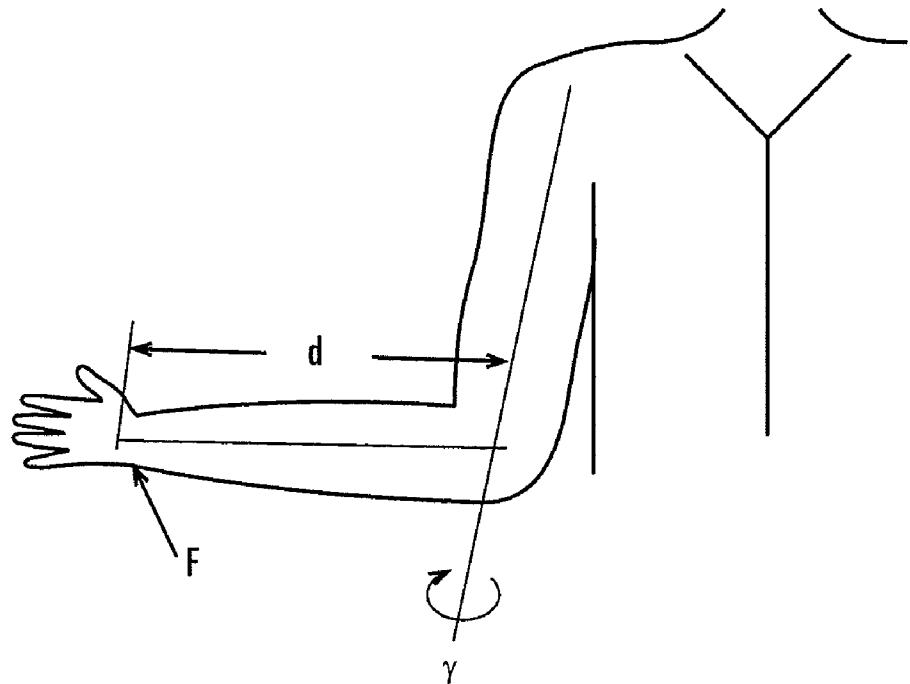
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Initial Position

Fig. 29A



$$\gamma = F \cdot d$$

Extended Position

Fig. 29B

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## SHOULDER EXTENSION CONTROL DEVICE

## CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of provisional patent application Ser. No. 60/341,371 filed Dec. 13, 2001. The present application claims the full benefit and priority of said application, and incorporates the entire contents of same by reference.

## FIELD OF THE INVENTION

The present invention relates generally to methods and apparatus for providing range of motion to a joint, and particularly relates to a apparatus for providing substantially complete control over the range of motion of the human shoulder.

## BACKGROUND OF THE INVENTION

The shoulder remains one of the most complex joints in the human body. It is composed of the clavicle or collar bone, the scapula or shoulder blade and the humerus or arm bone. There are two important joints in the shoulder: the glenohumeral joint or the joint between the arm bone and the shoulder blade, and the acromioclavicular joint or the joint between the collar bone and the shoulder blade.

There are three layers in the glenohumeral joint of the shoulder. Each layer provides a specific function to the joint. The most superficial layer is the deltoid muscle. It is one of the main motors of glenohumeral motion. The next layer is the rotator cuff musculature. It is a series of four muscles which connect the humerus to the shoulder blade and contributes to the fine motions of the glenohumeral joint. Finally there is the glenohumeral capsular ligaments which are fibrous connections between the humerus and the scapula. They control the extent of motion between the humerus and the scapula.

When the shoulder is injured or the shoulder has surgery, there is a loss of separation between the three layers of the glenohumeral joint. This is caused by excessive scar formation between the layers. Furthermore, there can be shortening or contracture of each individual layer during the injury or surgery process. Both the contracture of each layer and the scar formation between the layers causes a loss of motion between the humerus and scapula. The same process can occur between the scapula and the clavicle as well as the scapula and the thorax or chest of the patient.

The glenohumeral joint is capable of three specific motions: 1. abduction and adduction; 2. internal and external rotation; and 3. flexion and extension. Every position of the glenohumeral joint is a combination of these motions. Abduction of the humerus causes it to move away from the midline whereas adduction moves it towards the midline. Internal rotation of the humerus causes the forearm to rotate towards the body when the humerus is held at the patient's side whereas external rotation causes the forearm to rotate away from the body when the humerus is held at the patient's side. Finally, flexion of the humerus causes it to move forward away from the body whereas extension causes the humerus to backward away from the body.

There are two forms of therapy to help patients gain range of motion in injured or surgically impaired joints with motion loss. The first is manual therapy, which is a stretching program requiring direct hands-on manipulation by a therapist with the express intent of increasing motion in the affected joint. The second is mechanical therapy, which is a specific

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medical device designed to allow the patient to stretch the joint without the help of a therapist. It has been shown that the use of mechanical devices to assist the patient in gaining range of motion are both helpful and highly desired as a technique to help avoid surgical treatment of joint motion loss.

Therefore it is known to provide apparatuses which increase the range of motion for a shoulder. However, improvements are always welcomed.

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## SUMMARY OF THE INVENTION

Generally described, the present invention relates to methods and apparatus for providing complete patient control of joint range of motion and particularly relates to a apparatus for providing control of the range of motion of a human shoulder.

More particularly described, one aspect of the present invention relates to an apparatus for manipulating the shoulder joint of a human user, the apparatus comprising a frame including spaced apart first and second mounting locations, an arm carriage configured to manipulate the shoulder joint of the user, the arm carriage configured to be mounted to either the first or second mounting location of the frame, a power unit configured to provide power upon control by the user, the power unit configured to be mounted to the other of the first or second mounting location of the frame, a linkage intermediate the arm carriage and the power unit, the linkage configured to transfer power from the power unit to the arm carriage, the arm carriage, the power unit, and the linkage configured to allow the arm carriage and the power unit to be switched between the first and second mounting locations and operated in alternating modes, such that in a first operating mode the arm carriage can manipulate the right arm of the user, and such that in a second operating mode the arm carriage can manipulate the left arm of the user.

Therefore it is an object of the present invention to provide an improved methods and apparatus for providing complete patient control of joint range of motion.

Other objects, features, and advantages of the present invention will become apparent upon reading the following detailed description of the preferred embodiment of the invention when taken in conjunction with the drawing and the appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

Having thus described the invention in general terms, reference will now be made to the accompanying drawings, in which like numerals indicate like elements throughout the several views.

FIGS. 1-16 are directed towards a first embodiment of the invention.

FIGS. 17-29 are directed towards a second embodiment of the invention.

FIGS. 1 and 2 show a first embodiment of the apparatus 10, with FIG. 1 showing the apparatus 10 without an associated folding chair and FIG. 2 showing the apparatus 10 with an associated chair 9.

FIG. 3 shows a user 5 demonstrating the apparatus 10 as it provides abduction to, in this instance, the right shoulder of the user 5.

FIG. 4 shows a user 5 (viewed from the rear of the apparatus), situated within the apparatus 10, with the user's right arm in the arm carriage 50, and the apparatus 10 providing external rotation to the user's right shoulder within a range "R".

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FIG. 5 can be used to show the use of a single pivot-fixing pin **89**, alternately positionable at two separate locations, in order to provide two differing pivoting configurations.

FIG. 6 is a disassembled view of the apparatus **10**, with the various subapparatuses shown spaced apart. Specifically, subapparatuses **50** and **90** and **110** are shown spaced apart from the main portion of the apparatus. Subapparatus **50** is the arm carriage subapparatus, and is configured to accept the arm of a user. Subapparatus **90** is the power unit subapparatus **90**, and is configured to convert mechanical energy from the user to hydraulic energy. Subapparatus **110** is a torso retaining assembly.

FIG. 7 is a more detailed front view of the base **20** of the apparatus. The base **20** includes a horizontal transverse member **21**, a pair of horizontal side members **22**, rear feet **23**, front posts **24**, and front post flanges **25** (not shown in FIG. 7 but shown in FIG. 1).

FIG. 8 is a detailed view showing one of two downwardly facing slots **27**.

FIG. 9 is a detailed view showing one of two forwardly facing slots **26**, which is located in a corresponding one of the horizontal side members **22**.

FIG. 10 is a view of a portion of the apparatus **10**, shown in partially disassembled view, showing particulars of the main frame **40**. The main frame **40** includes a main horizontal member **41**, a secondary horizontal member **43**, side-mounting members **44**, and carriage gripping members **46**.

FIG. 11 is a detailed view of the adjustable mounting grip **31** which is located at the top of the spine **30**. It should be understood that each adjustable mounting grip **31** includes a corresponding adjustable mounting grip handle **32**.

FIG. 12 shows an isolated view of the arm carriage subassembly **50**.

FIG. 13 shows, through the use of dotted lines, the two different holes which this pivot-fixing pin **89** may be used, for differing results. In one type of therapy (abduction), the pivot-fixing pin **89** is used in one hole, whereas in another type of therapy (external rotation), the pivot-fixing pin **89** is used in another hole.

FIG. 14 shows indicia I which is located on the upper arm post **81**. This FIG. 14 likewise shows hole **81H**, which is defined by the upper arm post **81**. It may be understood that this hole **81H** is one of the two holes which the pivot fixing pin **89** is configured to be positioned.

FIG. 15 shows a mounting configuration according to the present invention.

FIG. 16 shows a hydraulic schematic which can be used with both embodiments of the invention.

FIG. 17 is a pictorial view of a second embodiment of the invention, as viewed from the front and slightly to the left of the apparatus **210**.

FIG. 18 shows a close-up view of the arm carriage **250**, viewed from the left and slightly to the front of the overall apparatus.

FIG. 19 shows another close-up view of the arm carriage **250**, viewed from the left and slightly to the rear of the overall apparatus.

FIG. 20 shows the apparatus **210** in its configuration for working abduction, as viewed from the rear.

FIG. 21 shows the apparatus **210** in its configuration for external rotation, as viewed from the rear.

FIG. 22 shows the configuration of the power unit **290** of the second embodiment of the invention. A portion of the frame **240**, including an anti-scapular retraction pad **285**, is likewise shown in FIG. 22.

FIG. 23 is a more detailed pictorial view of an anti-opposite shoulder rotation assembly **300**.

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FIG. 24 shows the padded arm cradles **262**, which have pins that fit holes in the cradle support bar **268** of the arm carriage **250**.

FIG. 25 shows the tape measure **230**, which includes tape **231**, similar to the configuration of the first embodiment.

FIG. 26 shows a front elevational view of the spine **230**, slidably and adjustably mounted relative to the frame **240**. Adjustment arrows are also shown.

FIG. 27 is a close-up view of both of the locking knobs for horizontal fixation, and the locking keys for vertical fixation. This is a view from the rear of the apparatus.

FIG. 28 is a close-up view of one of the locking keys for vertical fixation of the frame **240** relative to the spine **230**. This is a view from the right and slightly to the front of the apparatus.

FIGS. 29A and 29B are illustrative drawings illustrating the variable elbow extension concept. FIG. 29A shows the forearm in a forwardly oriented position, and FIG. 29B shows the forearm rotated such that it is generally sidewardly oriented.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

It should be understood that the following description will be done with respect to multiple embodiments, including a first and a second embodiment, as well as various options which may be included with either embodiment.

## First Embodiment (FIGS. 1-16)

The discussion of the first embodiment of the invention will be discussed with reference to FIGS. 1-16.

## Elements of First Embodiment

User **5**

Chair **6**

Rear Chair Rail **7**

Front Chair Rail **8**

Inventive Apparatus **10**

Base **20**

Horizontal Transverse Member **21**

Horizontal Side Members **22**

Rear Feet **23**

Front Posts **24**

Front Post Flanges **25**

Forwardly Facing Slots **26**

Downwardly Facing Slots **27**

Spine **30**

Adjustable Mounting Grip **31**

Adjustable Mounting Grip Handle **32**

Main Frame **40**

Main horizontal member **41**

Vertical Side Members **42**

Secondary Horizontal Member **43**

Side Mounting Members **44**

Carriage Gripping Members **46**

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## 5

Carriage Gripping Member Head 46H  
 Arm Carriage 50  
 Forearm Retention Subassembly 60  
 T-Shaped Base Portion 61  
 Arm Cradles 62  
 Tape Mounting Flange 63  
 Cylinder End Mounts 64  
 Fixed Pivot Pin 65  
 Elbow Subassembly 70  
 L-Shaped Member 71  
 Retaining Bracket 72  
 Height Adjustment Lock Pin 73  
 Upper Arm Retention Subassembly 80  
 Upper Arm Post 81  
 Upper Arm Post Hole 81H  
 Cylinder Mount 82  
 L-Shaped Shoulder Retaining Assembly 84 a.k.a. anti-scapular elevation pad  
 Arm Carriage Mounting Member 86  
 Fixed Pivot Pin 87  
 Locating Pin 88 (sets height before fixing)  
 Pivot Fixing Pin 89  
 Power Unit 90  
 Vertical Main Column 92  
 Main Column Height Locating Pin  
 Vertical Reservoir Subcolumn  
 Pivoting Pump Handle 95  
 Power Cylinder 96  
 Horizontal Mounting Bracket 97  
 Working (attached via plumbing) Main Cylinder 98

## Torso Retention Assembly 110

Plumbing 120  
 Tape Measure 130  
 Tape 131

## Detailed Discussion of First Embodiment

## General Construction

FIGS. 1 and 2 show a first embodiment of the apparatus 10, with FIG. 1 showing the apparatus 10 without an associated folding chair and FIG. 2 showing the apparatus 10 with an associated chair 9. The apparatus 9 includes a base 20, a spine 30, a main frame 40, an arm carriage 50, a power unit 90, a torso retaining assembly 110 (not shown in FIG. 1 or 2 but shown in FIG. 4), plumbing 120 (not shown in FIG. A), and a tape measure 130.

## General Operation

The apparatus and method of using same is configured to provide patient control of joint range of motion and particularly relates to a apparatus for providing control of the range of motion of a human shoulder. Particularly, this joint range of motion includes abduction and external rotation of the shoulder for a human user.

The apparatus is configured to allow for manipulation of either the right or left shoulder of the user upon the completion of a first changeover technique, and allows for either abduction or external rotation of a particular shoulder upon completion of a second changeover technique.

FIG. 3 shows a user 5 demonstrating the apparatus 10 as it provides abduction to, in this instance, the right shoulder of the user 5. As may be seen through the progressing stages of use of the apparatus, the shoulder can be progressively abducted from proximate the "UP" position shown to proximate the "DOWN" position shown, within the range designated as "R".

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Note particularly use of an L-shaped shoulder retaining assembly element 84, also known as a "anti-scapular elevation pad assembly" 84, which provides an acromial counterpoint by maintaining the shoulder in place preventing vertical elevation of the scapula during the abduction process. This element is part of and moves along with the arm carriage 50 as discussed in more detail elsewhere. However it should be understood that another embodiment includes the use of such an element 284 which is stationary although adjustable. As noted above either of these elements may also be referenced as including an "anti-scapular elevation pad".

In FIG. 3, the user 5 may be shown with his left hand positioned on a pivoting pump handle 95 of a power unit 90 (discussed in detail further in this application), and his right arm cradled in an arm carriage 50, discussed in detail later in this application. As will also be discussed later in this application, the positions of the arm carriage 50 and the power unit can be interchanged relative to the main frame of the apparatus 10.

FIG. 4 shows a user 5 (viewed from the rear of the apparatus), situated within the apparatus 10, with the user's right arm in the arm carriage 50, and the apparatus 10 providing external rotation to the user's right shoulder within a range "R". The movement of the apparatus from the position within range "R" is provided by use of a hydraulic cylinder 98, and the use of associated hydraulics discussed elsewhere in this application, which are powered by the power unit 90 (e.g. shown in FIG. 3). Briefly stated, the arm carriage 50, when in the mode of operation shown in FIG. 4, pivots about a substantially vertical pivot axis which is Axis B shown in FIG. 5.

FIG. 5 can be used to show the use of a single pivot-fixing pin 89, alternately positionable at two separate locations, in order to provide two differing pivoting configurations. When the pin 89 is at the position shown as 89', the apparatus is configured to provide abduction about axis "A". When the pin is positioned as shown in 89", the apparatus is configured to provide external rotation about axis "B".

In FIG. 5, three axes may be observed, with the "X" axis being a horizontal axis, generally directed "forward" relative to the normal sitting position. The "Z" axis is generally directed towards the "right" end of the user in the normal sitting position, and the "Y" axis is an axis substantially perpendicular to the other two aforementioned axes and is generally directed vertically "up". Reference back to these three axes will be made throughout this application.

## Disassembled Views

FIG. 6 is a disassembled view of the apparatus 10, with the various subapparatuses shown spaced apart. Specifically, subapparatuses 50 and 90 and 110 are shown spaced apart from the main portion of the apparatus. Subapparatus 50 is the arm carriage subapparatus, and is configured to accept the arm of a user. Subapparatus 90 is the power unit subapparatus 90, and is configured to convert mechanical energy from the user to hydraulic energy. Subapparatus 110 is a torso retaining assembly.

## Base 20

FIG. 7 is a more detailed front view of the base 20 of the apparatus.

The base 20 includes a horizontal transverse member 21, a pair of horizontal side members 22, rear feet 23, front posts 24, and front post flanges 25 (not shown in FIG. 7 but shown in FIG. 1).

The horizontal transverse member 21 is, when the user is situated in the seat, positioned generally parallel to the Z axis referenced in FIG. 5.

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The horizontal side members 22 are attached substantially rigidly to the ends of the horizontal transverse member 21. The horizontal side members 22 have longitudinal axis which are substantially parallel, and each of the horizontal side members has a medial portion attached substantially rigidly to corresponding outer ends of the horizontal transverse member 21. The longitudinal axes of the horizontal side members 22 are substantially parallel, and parallel to the X axis referenced in FIG. 5.

The rear feet 23 extend generally downwardly from the rear ends of corresponding horizontal side members 22, and are substantially rigidly attached relative to the horizontal side members 22. The longitudinal axes of these rear feet 23, which are substantially elongate, are substantially parallel to the Y axis referenced in FIG. 5.

The front posts 24 extend generally upwardly from the front ends of corresponding horizontal side members 22 such that they are substantially perpendicular to the horizontal side members. At the ends of these front posts 24 are positioned front post flanges 25, which support tape measures as needed, discussed in more detail later in this application.

Referring now also to FIGS. 8 and 9, each of the horizontal side members 22 includes one downwardly facing slot 27 and a forwardly facing slot 26. Reference is particularly made to FIG. 8, which is a detailed view showing one of two downwardly facing slots 27. Reference is made to FIG. 9, which is a detailed view showing one of two forwardly facing slots 26, which is located in a corresponding one of the horizontal side members 22. These slots 26 and 27 are configured to engage rails which are located within typical folding chairs 6 such as shown in the figures.

The forwardly facing slots 26 are configured to engage front chair rail 8 of the chair 6 whereas the downwardly facing slots 27 are configured to engage a rearwardly located chair rail 7. It may be understood that, when the apparatus is in its located position, these slots provide a configuration which allows for mechanical engagement of the apparatus 10 relative to the chair 6. Particularly, the weight of the apparatus 10 is borne by the rear chair rail 7, along with the rear feet 23.

### Spine 30

Referencing again to FIG. 7, as may be seen a spine 30 extends rigidly upwardly from the middle of the horizontal transverse member 21. Referring now also to FIG. 11, the top of this spine 30 releasably grips a portion of the main frame 40 as discussed below, said releasable gripping allowing for lateral adjustment of the frame 40 relative to the supporting spine 30 thereof along the directions of the arrows. This allows for adjustment of the device to accommodate varying torso lengths.

### Main Frame 40

FIG. 10 is a view of a portion of the apparatus 10, shown in partially disassembled view, showing particulars of the main frame 40. The main frame 40 includes a main 30 horizontal member 41, a secondary horizontal member 43, side-mounting members 44, and carriage gripping members 46.

The main horizontal member 41 is substantially elongate and is in its normal operating position substantially parallel to the "Z" axis of FIG. 5. The vertical side members are attached to each end of the main horizontal member 41, and have their longitudinal axes substantially co-parallel and likewise parallel to the "Y" axis shown in FIG. 5.

The secondary horizontal member 43 is rigidly attached relative to the vertical side members 42, and is substantially elongate, having a longitudinal axis substantially parallel to and above the longitudinal axis of main horizontal member 41.

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It should be understood that main horizontal member 41, vertical side members 42, and secondary horizontal member 43 combine to form a substantially rectangular rigid framework.

5 Side mounting members 44 are substantially rigidly mounted to corresponding side members 42, although some adjustment is available between the members 44 and 42.

Two carriage-gripping members 46 are used in the preferred embodiment, with one carriage-gripping member 46 10 located in association with each of the side-mounting members 44. Referring also temporarily to FIG. 15, each carriage-gripping member 46 includes a carriage gripping member head 46H, and as discussed later in this application, allows for selective attachment and detachment of the arm carriage 50 15 and the power unit 90, relative to either of the side-mounting members 44 of the main frame 40.

As discussed elsewhere in this application, it may be understood that the arm carriage 50 and the power unit 90 may be "switched" to either side of the main frame 40, depending on 20 which of the arms require therapy for the particular user.

FIG. 11 is a detailed view of the adjustable mounting grip 31 which is located at the top of the spine 30. It should be understood that each adjustable mounting grip 31 includes a corresponding adjustable mounting grip handle 32.

25 FIG. 11 shows a user's hand on one of the two adjustable mounting grip handles 32. It should be understood that manual adjustment of such handles, allows for lateral adjustment of the entire frame 40 relative to the spine 30, along the axis of the two-headed arrow. Such manual adjustment is desirable when adjusting the apparatus relative to a particular user, particularly when adjusting the apparatus between the external rotation therapy position and the abduction therapy position.

### 35 Arm Carriage Subassembly 50

FIG. 12 shows an isolated view of the arm carriage subassembly 50.

The arm carriage subassembly 50 includes a forearm retention subassembly 60, an elbow subassembly 70, and a upper 40 arm retention subassembly 80. FIG. 12 shows these three subassemblies 60, 70, and 80.

The forearm retention subassembly 60 includes a T-shaped base portion 61, two arm cradles 62, a tape-mounting flange 63, two cylinder end mounts 64 (only one is used, depending 45 on right-hand or left-hand operation during external rotation), and likewise includes a pivot fixing pin 89.

The upper arm retention subassembly 80 includes an upper arm post 81 (which defines an upper arm post hole 81H), a cylinder mount 82 (for abduction), an L-shaped "anti-scapular elevation pad assembly" 84, an arm carriage mounting member 86, and includes a fixed pivot pin 87 (see also FIG. 50 13). A locating pin 88 is also included, which is configured to set the height of the unit 50. Finally, a pivot fixing pin 89 is also included, which is shown as being attached relative to the 55 arm carriage assembly 50 by use of a flexible cable, such that this pivot fixing pin 89 may be moved between two different holes as described later in this application.

FIG. 13 shows, through the use of dotted lines, the two 60 different holes which this pivot fixing pin 89 may be used, for differing results. In one type of therapy (abduction), the pivot-fixing pin 89 is used in one hole, whereas in another type of therapy (external rotation), the pivot-fixing pin 89 is used in another hole. This FIG. 13 likewise shows the two-cylinder end mounts 64, which are used when external rotation is 65 desired. It may be understood that one of these cylinder end mounts 64 is used "right hand" mode whereas the other cylinder end mount 64 is used in the "left hand" mode.

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FIG. 14 shows indicia I which is located on the upper arm post 81. This FIG. 14 likewise shows hole 81H, which is defined by the upper arm post 81. It may be understood that this hole 81H is one of the two holes which the pivot fixing pin 89 is configured to be positioned. For example, when the pivot-fixing pin 89 is positioned within the hole 81H, the apparatus is configured to provide external rotation. However, when the pivot-fixing pin 89 is not positioned in the hole 81H, but instead is positioned within the hole located on the underneath of the apparatus as shown in FIG. 13, this provides the apparatus with a configuration, which allows for abduction.

Referring back momentarily to FIG. 5, pin position 89' shows the pivot-fixing pin 89 in the position, which fixes the arm carriage 50 in its configuration suitable for abduction. Position 89" shows the pivot-fixing pin 89 in the position, which fixes the arm carriage 50 in its configuration suitable for external rotation. FIG. 5 likewise shows the fixed pivot axis B, which provides a fixed pivoting location between the T-shaped based portion 61 and the elbow subassembly 70 in order to effect pivoting for external rotation. In comparison, as shown, in FIG. 5, fixed pivot pin axis A provides a fixed pivot location between the upper arm post 81 and the arm carriage mounting member 86.

FIG. 13 shows the two arm cradles 62 which are rigidly but adjustably mounted on the T-shaped based portion 61. Each of these arm cradles 62 can include associated strapping as needed for releasably securing the forearm of a user. It may be further understood that when in place the general longitudinal axis of the forearm of the user is substantially parallel to the forward portion of the T-shaped base portion 61 in the usual position. It may also be understood that when in place the longitudinal axis of the upper arm of the user is substantially parallel to the longitudinal axis of the elongate upper arm post 81.

## Power Unit 90

Reference is made back generally to FIGS. 1-3, showing the power unit 90 relative to the main frame 40 of the apparatus. It may be understood that the power unit 90 is selectively detachable relative to the frame 40 of the apparatus. The power unit 90 includes a vertical main column 92, a main column height locating pin, a vertical reservoir subcolumn, a pivoting pump handle 95 (shown operated by the left arm of the user in FIGS. 1-3), a small cylinder 96 (a.k.a. "power" cylinder), a horizontal mounting bracket 97, and a main cylinder 98 (shown in a first position in FIG. 1 and in a second position in FIG. 2).

The vertical main column 92 (see FIG. 2) is configured to be mounted to either of the two side mounting members 44 (see FIG. 10), by use of the carriage gripping members 46 and the main column height locating pin, as discussed elsewhere in this application. The vertical reservoir subcolumn is configured to provide a reservoir for hydraulic fluid as discussed elsewhere in this application.

The pivoting pump handle 95 is pivotably attached relative to the vertical reservoir subcolumn 94. A small cylinder 96 (a.k.a. "power" cylinder) is positioned such that reciprocating pivoting of the pivoting pump handle 95 causes a pumping action to the cylinder 96. Through hydraulics as discussed elsewhere in this application, such pumping causes fluid pressurized within the cylinder 96 to be likewise to transfer pressure of fluid within the working main cylinder 98, such that work is done by the working main cylinder 98.

The vertical reservoir subcolumn is rigidly attached relative to the upper end of the vertical main column 92. Underneath the lower end of the vertical reservoir subcolumn 94 is

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mounted by the horizontal-mounting bracket 97. This horizontal-mounting bracket 97 also provides for support of a torso retaining assembly 110 as described later in this application.

## Switchable Mounting Configuration

As noted above, the use of the side-mounting members 44 allow for the power unit and the arm carriage to be switched relative to the frame 40. Note that FIGS. 1 and 2 show the switchable concept with respect to positioning of the power unit 98.

Reference is now made to FIG. 15, which as may be understood, includes the use of a main column height locating pin 88, which provides for location of the two elements 86, 44, whereas the actual gripping is done by the use of the carriage gripping element 46. Also shown are illustrative markings shown thereon, with the dotted lines showing the shaft of the locating pin 88, as well as the shaft and head member of the carriage gripping element 46.

## 20 Torso Retaining Assembly 110

FIG. 4 shows the torso retaining assembly 110 positioned adjacent the front of the left shoulder of a user. The horizontal-mounting bracket 97 is used to support such an element. It should be understood that, if the power unit 90 is switched to the other side, likewise is the torso retaining assembly 110 switched to the other side of the horizontal-mounting bracket 97. This torso retaining assembly 110 may also be referenced as an "anti-opposite shoulder rotation assembly" 110, and is also included in the second embodiment of the invention, discussed in later detail as shown in FIG. 23 as element 301. Such elements 110, 310 are useful in limiting torso rotation during the external rotation process.

## 35 Plumbing 120

FIG. 16 shows a schematic-type drawing of said plumbing, which is but one of several options available. This one includes a valve arrangement which facilitates the use of an "extend" as well as a "retract" position for a manually movable switch, in which the user can manipulate the switch to the "extend" position such that pumping of the pump cylinder (e.g. power cylinder 96) causes extension of the main cylinder (e.g. working cylinder 98), and whereas the user can manipulate the switch to the "retract" position such that pumping of the pump cylinder (e.g. power cylinder 96) causes retraction of the main cylinder (e.g. working cylinder 98). An alternate version includes the use of springs or other suitable devices for a return feature, with pumping only being used to provide cylinder extension and the springs/etc used to provide retraction.

## 50 Tape Measure 130

FIG. 1 shows the front post flanges 25, located on either side of the seat of the chair.

FIG. 2 shows the tape measure 130, which is attached to one of the front post flanges 25. The tape 130 includes an extendable tape portion 131, which may be used to provide a general guide of the extent to which the element 50 is moved relative to the stationary elements.

## 60 Switchover to Abduction Mode

FIG. 13 is intended to illustrate a manner in which the abduction mode of the apparatus can be selected, should a "switch over" be desired from its external rotation mode. Depending on the positioning of the pin 89.

65 Insertion of a pivot-fixing pin 89 into the underneath of the arm carriage 50 is configured to provide the mechanism in its "abduction" mode.

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Note that the "offset" nature of the frame during adduction allows for some pre-inclination of the arm carriage 50 prior to the abduction feature. It may be understood that this "offset" feature allows for alignment of the pivoting axis of the arm carriage 50 with the normal pivoting axis the shoulder during abduction. 5

## Switchover to External Rotation Mode

FIG. 4. shows the apparatus in various stages of external rotation. 10

## Adjustments

## Arm Carriage Height

The overall height of the arm carriage is adjusted by use of the carriage-gripping member 46 in conjunction with the locating pin 88. The locating pin is removed, the carriage gripping member 46 is loosened, and adjustment between the side mounting member 44 and the arm carriage mounting member 86 is made, upon which the pin 88 is reinserted (into suitably aligned holes in the members 44, 86) and the carriage gripping member 46 is retightened. 15 20

## Power Unit Height

Such adjustment, between members 92 and 94, is similar to the adjustment of the arm carriage as described above. 25

## Upper Arm Length

Upper arm length adjustment is made by use of the height adjustment lock pin 73 in conjunction with the retaining bracket 72. The height adjustment lock pin 73 is removed, and adjustment between the upper arm post 81 and the L-shaped member 71. Once adjustment is made (by use of indicia I) the pin 73 is reinserted (into suitably aligned holes in the members 71, 81). 30

## Torso Retention Member 110

Adjustment is done by loosening fixing hardware and moving as needed. 35

## Discussion of Operation of First Embodiment

The following instructions describe the set-up and operation of (applicant) ERMI's shoulder machine for two (2) degrees of movement—external rotation and abduction. Reference will be made to each type of motion where there are differences, otherwise the set-up and operation of the shoulder machine is the same for each. 40

## Set Up Instructions (to be done by Nurse or Technical Assistant)

## 1) Attach base to folding chair

Open folding chair approximately three-quarters

Rest horizontal base of mainframe over rear rung and slide forward to insert front notches onto front rung. 45

Rotate tape measure supports outward to clear chair seat Continue opening chair until rear notches lock onto rear rung

Position and lock upper portion of mainframe as follows:

External rotation—place frame in center position

Abduction—slide frame to full left position for right arm use and to full right position for left arm use. 50

## 2) Measure Patient with tool provided

For external rotation, measure width between underarms (positions Small/Medium/Large)

## For abduction

With patient properly seated in chair, measure gleno-humeral joint height (positions 1 through 5)

With patient properly seated in chair, measure humeral length (positions 1 through 5)

## 3) Attach arm unit to main frame

For external rotation, the gleno-humeral joint height pin and the humeral length pin can be at any position (1 through 5) provided they are the same 65

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For abduction, the gleno-humeral joint height pin and the humeral length pin must be at their respective positions as measured in step (2) above

With height pin halfway through arm unit, slide arm unit onto head of carriage bolt, complete insertion of height pin into mating hold in main frame, and tighten clamp with handle point down

## For external rotation

Insert lockout pin to prevent abduction movement

Position forearm support brackets

Rear bracket to support outside of forearm at elbow with strap toward front

Front bracket to support inside of forearm at wrist with strap toward rear

## For abduction

Insert lockout pin to prevent external rotation

Position both forearm support brackets on inside of forearm with strap on rear bracket toward front

Place shoulder support bracket onto arm unit with center of bracket opposite pivot bolt of arm unit.

Attach tape measure from arm unit to bracket on main-frame at front of seat

## 4) Attach power unit to main frame

With attaching pin halfway through power unit, slide power unit onto head of carriage bolt, complete insertion of pin into mating hole in main frame, and tighten clamp with handle point down

Adjust height of pump and handle assembly to match height of glenohumeral joints (positions 1 through 5).

For external rotation, install the anti-rotation device onto its bracket in the position as measured in step (2) above (small/medium/large)

Attach the power cylinder rod clevis to the appropriate position to complete set-up. Extend or retract cylinder rod manually or with pump to insert pin. 35

## Setup Instructions (e.g. for patient)

1) Attachment of base to the folding chair.

## 40 Operating Instructions

1. Sit in chair.

2. Place forearm onto support brackets with rear of elbow touching frame.

3. For abduction pull Velcro strap over forearm at bend in elbow to secure elbow in frame.

4. For external rotation slip opposite arm under the anti-rotation device.

For external rotation slip affected limb's forearm into the forearm cradle and secure with Velcro strap.

5. Place switch in stretch position.

6. Pump gently until position of comfortable pain is reached and hold for 0 to 5-minute intervals of stretch with the same amount of time spent not stretching in recovery.

7. Flip switch to relax position.

8. Pump or pull arm into position where the joint is not being stretched for thirty seconds to one minute.

9. This is repeated for a total of 15 minutes of stretch.

Note that various additions or variations may be added to this version without departing from the spirit and scope of the present invention. Some of these changes have been included in the Second Embodiment below:

1. Velcro and multiple thickness pads and/or bolts could be used to adjust the distance of the acromial counter rotation pad from the patient's acromion (top of shoulder).

2. The power unit 90 can be tilted forward at an angle to allow better access to the extend/retract switch.

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3. The power unit 90 can have the manifold that sits on top of the fluid storage container.
4. The spine 30 can allow for height adjustment of Main Frame 40.
5. The Arm Carriage 50 can include adjustable height Arm Cradles 62 to allow for better positioning of the patient's forearm into the cradle. The patient's arm (shoulder to elbow) distance can vary and needs to be adjusted between the Spine and the Arm Cradle adjustments.

## Second Embodiment (See FIGS. 17-29)

Reference is now made to FIGS. 17-29, which show a second embodiment apparatus 210 of the present invention. It may be understood that many of the same features are present between the two embodiments, and so a complete detailed discussion of the second embodiment will not be made to the extent it would include repetition; however there are certain differences:

- The positioning of the power unit 290
- The adjustability of the height of the arm cradles
- The adjustability of the frame 240
- The use of a stationary anti-scapular elevation pad 284
- The adjustability of the anti-opposite shoulder rotation bar to accommodate for width as well as depth of the thorax.
- The Scapular Anti-Retraction pad was added.
- An increase in adjustability of the anti-scapular elevation pad 284 was increased.
- Increased adjustability of arm cradle pads
- Improved position of hydraulic switch

FIG. 17 shows the apparatus 210 according to the second embodiment of the present invention, as viewed in a pictorial view from a position to the right and to the front of the apparatus. It may be seen that in this embodiment the arm carriage 250 happens to be mounted for left shoulder manipulation; the first embodiment was shown configured for right shoulder manipulation.

Note in FIG. 17 the use of a stationary shoulder retaining assembly 284, also known as a "anti-scapular elevation pad assembly" 284, which is fixed relative to the frame 240 of the apparatus 210, and does not move with the arm carriage 250 as in the first embodiment.

FIG. 18 shows a close-up view of the arm carriage 250, viewed from the left and slightly to the front of the overall apparatus. The arm carriage 250 is different than the arm carriage 25 of the first embodiment in that a vertically adjustable feature is included. The arm carriage 250 includes a cradle support bar 268 (which supports arm cradles, not shown in FIG. 18, but discussed elsewhere), and a vertical adjustment member 267, which is attached in a perpendicular manner to the cradle support bar 268. These two rigidly attached members 267, 268, are adjustably attach to the remainder of the arm carriage assembly 250. Such vertical adjustment is made by the use of two locking knobs, one of which is shown as 269.

FIG. 19 shows another close-up view of the arm carriage 250, viewed from the left and slightly to the rear of the overall apparatus. This view shows the cylinder end mounts 264 of the second embodiment, which are essentially the same in shape and function as those in the first embodiment.

FIGS. 18 and 19 both show the arm carriage 250 also including an upper arm post 281 and an arm carriage-mounting member 286. This configuration is slightly different from the first embodiment in that the arm carriage-mounting member 286 of the arm carriage 250 is mounted directly (but detachably) relative to the frame 240 of the apparatus 210. Likewise, the frame of the power unit 290 is detachably

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mounted directly (but detachably) relative to the frame 240 of the apparatus 210. This allows these two elements 250, 290, to be interchangeably mounted as in the first embodiment. The mounting of these two elements 250, 290, to the frame is done by the use of two locating pins, one for each element, which holds the respective element in place while hex head machine screws or the like are used to provide a more secure fix between the elements 250, 290, to the frame. It may be understood that this does not allow for ready vertical adjustment of the overall elements 250, 290, to the frame, but such adjustment is accomplished in other manners as discussed elsewhere.

It should be understood that the changeover from abduction to external rotation is essentially the same in the second embodiment as in the first embodiment; a pin is used to selectively fix one of the two pivot points.

FIG. 20 shows the apparatus 210 in its configuration for working abduction. As may be seen, the working main cylinder 298 used in the second embodiment, which is part of the power unit 290, is used in a manner similar to the first embodiment.

FIG. 21 shows the apparatus 210 in its configuration for external rotation. Again as may be seen, the working main cylinder 298 is used in the second embodiment in a manner similar to the first embodiment.

FIG. 22 shows the configuration of the power unit 290 of the second embodiment of the invention. As may be seen, this configuration is different than that of the first embodiment. The toggle switch 310 also has a new position. This power unit 290 includes a substantially horizontal frame member 299 which is configured to support the anti-rotation attachment as discussed elsewhere in this application.

A portion of the frame 240, including an anti-scapular retraction pad 285, is likewise shown in FIG. 22. The anti-scapular retraction pad 285 is part of an assembly which includes a rigid metal plate which extends across the width of the upper portion of the frame 240 and is attached to the two vertical members of the frame. The metal plate supports the pad 285. This member is shown in at least FIGS. 17, 20, 22 and 26. The anti-scapular retraction pad 285 is configured to be positioned behind the shoulder blades of the user, and to discourage movement of the scapula of the user in a rearward direction from the standpoint of the user. This element 285 works in cooperation with the anti-opposite shoulder rotation pad member 301 during the external rotation process. Particularly, the anti-scapular retraction pad 285 is positioned behind the patient such that the pad contacts the posterior scapula of each shoulder such that when the arm is externally rotated the scapula is prevented from retracting. This prevents the external rotation developed by the apparatus from occurring at the capulothoracic joint as opposed to the glenohumeral joint.

FIG. 23 shows an anti-opposite shoulder rotation assembly 300 (also known as an opposite shoulder anti-rotation assembly) used in the second embodiment of the invention. The base of the anti-opposite shoulder rotation assembly 300 slides back and forth on Teflon or other suitable bearings on the frame member 299 of the power unit 290. Such adjustment makes it possible to adjust for chest depth. An elongate secondary bar is slidably mounted to the base and supports the padded restriction member 301 (also known as an anti-opposite shoulder rotation pad member 301), which contacts the body of the user. The secondary bar adjustably slides sideways so that it can accommodate patients with varying shoulder widths. The anti-opposite shoulder rotation pad assembly 300 tends to limit the user's ability to rotate the upper body when working on external rotation.

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FIG. 24 shows the padded arm cradles 262, which have pins that fit holes in the cradle support bar 268 of the arm carriage 250. Depending on arm length the padded arm cradles 262 are placed in the appropriate position. In this figure one arm cradle is out of position to show the pins.

FIG. 25 shows the tape measure 230, which includes tape 231, similar to the configuration of the first embodiment. It may be seen that the tape measure 230 attaches to the chair and to the arm cradle. When the arm cradle is rotated away from the chair the distance is recorded on the tape measure 230 attached to the chair. This distance is a relative measure of progress of external rotation of the shoulder.

FIG. 26 shows a front elevational view of the spine 230, slidably and adjustably mounted relative to the frame 240. Adjustment arrows are also shown.

FIG. 27 is a close-up view of both the locking knobs for horizontal fixation, and the locking keys for vertical fixation. This is a view from the rear of the apparatus.

FIG. 28 is a close-up view of one of the locking keys for vertical fixation of the frame 240 relative to the spine 230. This is a view from the right and slightly to the front of the apparatus.

Referring now to FIGS. 26, 27, and 28, the frame 240 of the second embodiment apparatus can slide sideways (see arrow "S") to adjust for patient size and also to adjust settings when working on external rotation or abduction. The spine 230 is slidably and adjustably mounted relative to the frame 240, such that the combination of the frame 240, the spine 230 and the base (not shown in FIG. 26) can be compressed and this is the new way to adjust for height (see vertical arrow "H"). Since such height adjustment moves the frame up and down, both the height of the power unit and the height of the arm unit are adjusted at the same time. The gas cylinder facilitates lifting the structure since compressed gas helps push the structure up. Two locking keys or other suitable locking devices can be used to keep the structure in its desired position.

## Variable Elbow Extension

It should be understood that a significant feature of the invention includes the provision of variable elbow extension during the external rotation process. This configuration develops force at the hand which develops a significant amount of torque at the shoulder. Reference is made to FIGS. 29A and 29B for discussion. FIGS. 29A and 29B are illustrative drawings illustrating the variable elbow extension concept.

Such variable elbow extension provides the elbow with approximately ninety (90) degrees of bend when the arm is in the initial position, but provides an additional amount (for example twenty (20) degrees) with the arm rotated in its full (approx) 65 degrees of external rotation to its extended position.

Such variable elbow extension is provided as follows. The arm of the user is positioned within the arm carriage, and the apparatus is adjusted so that the arm is positioned for suitable movement from its initial to its extended position throughout external rotation. Several adjustments can be made to the apparatus in order to position the forearm of the user at a horizontal orientation, including adjustments to the height of the arm carriage, and/or adjustments to the height or lateral position of the frame. As the pivot axis of the arm carriage is substantially vertical, it should thus be understood that the forearm of the user would remain at a horizontal orientation throughout external rotation. Said another way, the forearm will "sweep" within a horizontal plane during its movement. This is an important restriction as will be recognized below.

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The above adjustments can also be made to provide proper positioning of the upper arm of the user, which is for the most part vertical, but inclined slightly out to the side of the user, for purposes of discussion approximately twenty degrees.

As noted above, the pivot axis of the arm carriage is substantially vertical, and under one embodiment of the invention, passes approximately through the elbow region. Under this configuration, the elbow remains substantially stationary (although it is being rotated) during the external rotation process. The upper arm likewise remains substantially stationary (although it is being rotated about its longitudinal axis) throughout the external rotation process.

Therefore it may be seen that when the arm of the user is moved from its initial position to its extended position, the elbow is manipulated from a bend angle of approximately 90 degrees to approximately 110 degrees, as the elbow tends to "open up" gradually as external rotation is performed, due to the fact that the forearm of the user is restricted to movement in a horizontal plane.

Furthermore, this apparatus allows for the elbow to extend slightly during the application of external rotation such that different parts of the elbow ligament complex "sees" the load at different positions of external rotation. The figure demonstrates the structures of the medial elbow including the medial ligament complex and the flexor bundle. These structures get stressed as load is placed at the hand creating an external rotation moment at the elbow and subsequently the shoulder. Different parts of these structures are stressed during load application depending upon the flexion/extension position of the elbow. In other words, the anterior portion of the medial ligament is more stressed with the elbow in extension while the posterior portion of the ligament is more stressed with the elbow in flexion. This change in position of the elbow during the stretching process protects the elbow by distributing the stress of the rotational moment across more fibers of the medial collateral ligament of the elbow and more structures of the medial side of the elbow, thus helping to prevent injury at the elbow secondary to the stretching process.

## CONCLUSION

Many other modifications and other embodiments of the invention will come to mind to one skilled in the art to which this invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

That which is claimed:

1. An apparatus for manipulating the shoulder joint of the left or right arm of a human user, said apparatus comprising:  
a frame including spaced apart first and second mounting locations;  
an arm carriage configured to manipulate said shoulder joint of said user, said arm carriage configured to be mounted to one of said first and second mounting locations of said frame;  
a power unit configured to provide power upon control by said user, said power unit configured to be mounted to the other of said first and second mounting locations of said frame;  
a linkage intermediate said arm carriage and said power unit, said linkage configured to transfer power from said power unit to said arm carriage;

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said arm carriage, said power unit, and said linkage configured to allow said arm carriage and said power unit to be switched between said first and second mounting locations and operated in alternating modes, such that in a first operating mode said arm carriage can manipulate the right arm of said user, and such that in a second operating mode said arm carriage can manipulate the left arm of said user.

2. The apparatus as claimed in claim 1, wherein said carriage is configured to be adjustably mounted along either said first or second mounting locations of said frame, to allow for customizable adjustments for different users. 10

3. The apparatus as claimed in claim 2, further comprising a seat to allow said user to be seated during said shoulder joint manipulation. 15

4. The apparatus as claimed in claim 1, wherein said frame is operably attached relative to a supporting seat structure, and wherein said frame is adjustable to allow for customizable positioning for said user. 20

5. The apparatus as claimed in claim 4, wherein said supporting seat structure is provided by a conventional folding chair. 25

6. The apparatus as claimed in claim 1, further comprising a tape measure attached intermediate said arm carriage and said frame to provide said user with a relative measurement for the purpose of identifying improvement during the stretching process. 25

7. The apparatus as claimed in claim 1, wherein said arm carriage includes two power unit attachment locations, either of which is configured to be attached to said power unit through said linkage, such that for a particular arm being manipulated, linkage of said power unit to one attachment location provides abduction of said particular arm upon control of said power unit by said user, and linkage of said power unit to the other location provides external rotation of said particular arm upon control of said power unit by said user. 30

8. The apparatus as claimed in claim 1, further comprising an anti-scapular elevation pad member fixed relative to said arm carriage and configured to be move along with said arm carriage when said arm carriage is switched between said first and second mounting locations, said anti-scapular elevation pad member configured to discourage the shoulder blade or scapula from elevating or abducting when said arm carriage is manipulating said shoulder joint of the left or right arm of said human user. 40

9. The apparatus as claimed in claim 8, further comprising an anti-opposite shoulder rotation member fixed relative to said power unit and configured to be move along with said power unit when said power unit is switched between said first and second mounting locations, said anti-opposite shoulder rotation member configured to discourage rotation of the shoulder of said user not being manipulated by said arm carriage. 45

10. The apparatus as claimed in claim 1, further comprising an anti-opposite shoulder rotation member fixed relative to said power unit and configured to be move along with said power unit when said power unit is switched between said first and second mounting locations, said anti-opposite shoulder rotation member configured to discourage rotation of the shoulder of said user not being manipulated by said arm carriage. 50

11. An apparatus for manipulating the arm of a user while seated in a substantially upright position, said arm including an upper arm and a forearm, said apparatus comprising:

a frame having a power unit mounting location; 65  
a seat for a user to sit in such that said user can sit in said seat in said substantially upright sitting position while

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facing a direction substantially along a first axis, said axis being substantially horizontal;

an upper arm assembly pivotably mounted relative to said frame about a second axis, said second axis being substantially parallel to said first axis, said upper arm assembly also including an upper arm assembly power unit attachment location;

a forearm assembly pivotably mounted relative to said upper arm assembly about a third axis and configured to capture the forearm of the user during manipulation of the arm of the user, said third axis being substantially orthogonal to said second axis, said forearm assembly also including a forearm assembly power unit attachment location;

a power unit mounted to said frame at said power unit mounting location and including two opposing actuator ends capable of being moved alternately apart or together, said power unit configured to apply a linear force between said two actuator ends, said power unit further configured to have one of said actuator ends attached relative to said frame through the attachment of said power unit to said frame at said power unit mounting location, and to have the other of said actuator ends selectively attached to either said upper arm assembly power unit attachment location or to said forearm assembly power unit attachment location, such that when said other of said power unit actuator ends is selectively attached to said upper arm assembly power unit attachment location, application of said linear force by said power unit causes said upper arm assembly to pivot relative to said frame, and when said other of said power unit actuator ends is selectively attached to said forearm assembly power unit attachment location, application of said linear force by said power unit causes said forearm assembly to pivot relative to said upper arm assembly and to said frame; and

at least one locking mechanism configured to discourage pivoting of said forearm assembly relative to said upper arm assembly when said other of said power unit actuator ends is attached to said upper arm assembly power unit attachment location and further configured to discourage pivoting of said upper arm assembly relative to said frame when said other of said power unit actuator ends is attached to said forearm assembly power unit attachment location.

12. The apparatus of claim 11, wherein said power unit employs pressurized fluid to create the linear force.

13. The apparatus of claim 11, wherein said apparatus includes two locking mechanisms, one associated with selectively locking said upper arm assembly relative to said frame, and the other associated with selectively locking said forearm assembly relative to said upper arm assembly with a pivot fixing pin being used with in association with at least one of said locking mechanisms.

14. The apparatus of claim 11, wherein said user includes two arms, and wherein said power unit mounting location of said frame is a first power unit mounting location and wherein said frame further includes a second power unit mounting location, and wherein both said mounting members can also serve as spaced apart first and second arm carriage mounting locations,

wherein said upper arm assembly and said forearm assembly combine to form an arm carriage that is configured to manipulate the shoulder joint of the user, wherein said arm carriage is configured to be mounted to either said first or second arm carriage mounting locations of said frame,

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wherein said power unit is configured to provide power upon control by said user and is configured to be mounted to the other of said first or second arm carriage mounting locations of said frame, and said apparatus further comprising:

a linkage intermediate said arm carriage and said power unit, said linkage configured to transfer power from said power unit to said arm carriage,

said arm carriage, said power unit, and said linkage configured to allow said arm carriage and said power unit to be switched between said first and second arm carriage mounting locations and to be operated in alternating modes, such that in a first operating mode said arm carriage can manipulate the right arm of the user, and such that in a second operating mode said arm carriage can manipulate the left arm of the user.

15. The apparatus for manipulating the arm of a user as claimed in claim 11, wherein said forearm assembly is configured to remain below the vertical plane including said second axis during said pivoting of said forearm assembly about said third axis.

16. The apparatus for manipulating the arm of a user as claimed in claim 11, wherein said locking mechanism includes a single pivot fixing pin which can alternately be moved from between two positions, a first position, in which to discourage pivoting of said forearm assembly relative to said upper arm assembly, to a second position, to discourage pivoting of said upper arm assembly relative to said frame.

17. An apparatus for manipulating the shoulder joint of a human user, said apparatus comprising:

a frame including spaced apart first and second mounting locations;

an arm carriage configured to manipulate said shoulder joint of said user, said arm carriage configured to be mounted to one of said first and said second mounting locations of said frame; and

a power unit configured to provide power upon control by said user, said power unit configured to be mounted to the other of said first and said second mounting locations of said frame, said power unit including opposing first and second power unit actuator ends capable of being moved alternately apart or together, said power unit configured to apply a linear force between said first and second power unit actuator ends, said power unit further configured to connect the first of said power unit actuator ends at a first location relative to said frame while said power unit is attached at said first mounting location of said frame, and further configured to connect said first of said power unit actuator ends at a second location relative to said frame while said power unit is attached at said second mounting location of said frame,

45 said arm carriage, said power unit, and said frame configured to be selectively connected together to allow said arm carriage and said power unit to be switched between said first and second mounting locations and operated in alternating first and second modes,

such that in said first operating mode said power unit is attached to said frame at said first mounting location, and said second power unit actuator end is attached to said arm carriage such that said power unit and said arm carriage can manipulate the right arm of said user, and

such that in said second operating mode said power unit is attached to said frame at said second mounting location, and said second power unit actuator end is attached to said arm carriage such that said power unit and said arm carriage can manipulate the left arm of said user.

20

18. The apparatus as claimed in claim 17, wherein said power unit includes a manual pump handle which is placed into different fixed pivoting positions depending on whether the power unit is mounted at said first or second mounting location, and wherein power to said power unit is controlled by the left hand of said user operating said manual pump handle in said first operating mode, and wherein power to said power unit is controlled by the right hand of said user operating said same manual pump handle in said second operating mode.

19. The apparatus as claimed in claim 17, further comprising an anti-scapular elevation pad member fixed relative to said arm carriage and configured to be move along with said arm carriage when said arm carriage is switched between said first and second mounting locations, said anti-scapular elevation pad member configured to discourage the shoulder blade or scapula from elevating or abducting when said arm carriage is manipulating said shoulder joint of the left or right arm of said human user.

20. The apparatus as claimed in claim 19, further comprising an anti-opposite shoulder rotation member fixed relative to said power unit and configured to be move along with said power unit when said power unit is switched between said first and second mounting locations, said anti-opposite shoulder rotation member configured to discourage rotation of the shoulder of said user not being manipulated by said arm carriage.

21. The apparatus as claimed in claim 17, further comprising an anti-opposite shoulder rotation member fixed relative to said power unit and configured to be move along with said power unit when said power unit is switched between said first and second mounting locations, said anti-opposite shoulder rotation member configured to discourage rotation of the shoulder of said user not being manipulated by said arm carriage.

22. A method of manipulating the shoulder of a user while seated in a substantially upright position, said user having an upper arm and a forearm, said method comprising the steps of:

A) providing an apparatus itself comprising:

1) a frame;

2) a seat for a user to sit in such that said user can sit in said seat in said substantially upright sitting position while facing a direction substantially along a first axis, said axis being substantially horizontal;

3) an upper arm assembly pivotably mounted relative to said frame about a second axis, said second axis being substantially parallel to said first axis; and

4) a forearm assembly pivotably mounted relative to said upper arm assembly about a third axis and configured to capture the forearm of the user during manipulation of the arm of the user, said third axis being substantially orthogonal to said second axis;

B) securing the forearm of a user to said forearm assembly;

C) selectively discouraging relative movement of said forearm assembly with respect to said upper arm assembly while at the same time allowing said upper arm assembly and said forearm assembly to both pivot together relative to said frame about said second axis;

D) pivoting said upper arm assembly about said second axis relative to said frame while at the same time said relative movement of said forearm assembly with respect to said upper arm assembly is discouraged such that abduction/adduction of the shoulder is created;

E) selectively discouraging relative movement of said upper arm assembly with respect to said frame while at the same time allowing relative movement of said fore-

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**21**

arm assembly relative to said upper arm assembly and said frame about said third axis; and  
F) pivoting said forearm assembly about said third axis with respect to said upper arm assembly and with respect to said frame while at the same time said relative move-

**22**

ment of said upper arm assembly with respect to said frame is discouraged such that external rotation is created at said shoulder.

\* \* \* \* \*

## **Exhibit B**

US 7,547,289

Shoulder Extension Control Device

12/13/2002

	'289 Patent	T-REX SHOULDER
Claim 22:	A <b>method</b> of manipulating the shoulder of a user while seated in a substantially upright position, said user having an upper arm and a forearm, said method comprising the steps of:	*The T-REX Shoulder method does manipulate the shoulder of a user that sits upright- and the user must have an upper arm and forearm.
Element 1	A) providing an apparatus itself comprising:	*The T-REX Shoulder method does use an apparatus.
Element 2	1) a frame;	*As shown in the pictures below, the T-REX Shoulder apparatus has a frame.
Element 3	2) a seat for a user to sit in such that said user can sit in said seat in said substantially upright sitting position while facing a direction substantially along a first axis, said axis being substantially horizontal;	*As shown in the pictures below, the T-REX Shoulder apparatus has a seat that causes the user to sit upright.
Element 4	3) an upper arm assembly pivotably mounted relative to said frame about a second axis, said second axis being substantially parallel to said first axis; and	*As shown in the pictures below, the T-REX Shoulder apparatus has an upper arm assembly that is rotatable about an axis that is parallel to the direction the user is facing - this axis is located substantially about the user's shoulder.
Element 5	4) a forearm assembly pivotably mounted relative to said upper arm assembly about a third axis and configured to capture the forearm of the user during manipulation of the arm of the user, said third axis being substantially orthogonal to said second axis;	*As shown in the pictures below, the T-REX Shoulder apparatus has a forearm assembly designed to capture the forearm of the user during manipulation of the user's shoulder; *As shown in the pictures below, the forearm assembly is connected to the upper arm assembly about an axis that is orthogonal to the shoulder - this axis is located about the elbow joint of the user.
Element 6	B) securing the forearm of a user to said forearm assembly;	*As shown in the pictures below, the T-REX Shoulder apparatus uses straps to hold the user's forearm to the forearm assembly.
Element 7	C) selectively discouraging relative movement of said forearm assembly with respect to said upper arm assembly while at the same time allowing said upper arm assembly and said forearm assembly to both pivot together relative to said frame about said second axis;	*As shown in the pictures below, the T-REX Shoulder apparatus is capable of keeping the forearm and upper arm assemblies locked at a single angle, which discourages relative movement about the user's elbow; *As shown in the pictures below, at the same time, the T-REX Shoulder apparatus allows the forearm and upper arm assemblies to rotate about the axis through the shoulder of the user (the elbow is locked, but the arm can rotate about the shoulder).

Element 8	D) pivoting said upper arm assembly about said second axis relative to said frame while at the same time said relative movement of said forearm assembly with respect to said upper arm assembly is discouraged such that abduction/adduction of the shoulder is created;	*As shown in the pictures below, the T-REX Shoulder apparatus provides rotation of the forearm and upper arm assemblies, and therefore the arm of the user, about the axis parallel to the direction that the user is facing- this allows abduction and adduction of the user's shoulder.
Element 9	E) selectively discouraging relative movement of said upper arm assembly with respect to said frame while at the same time allowing relative movement of said forearm assembly relative to said upper arm assembly and said frame about said third axis; and	*As shown in the pictures below, the T-REX Shoulder apparatus provides rotation of the forearm assembly while keeping the upper arm assembly locked, relative to the supporting frame; *As shown in the pictures below, the axis that the elbow is allowed to rotate is orthogonal to the elbow's axis (See Element 5).
Element 10	F) pivoting said forearm assembly about said third axis with respect to said upper arm assembly and with respect to said frame while at the same time said relative movement of said upper arm assembly with respect to said frame is discouraged such that external rotation is created at said shoulder.	*As shown in the pictures below, the T-REX Shoulder apparatus provides pivoting of the forearm assembly about an axis with respect to the upper arm assembly, and with respect to the frame while the upper arm assembly is rigid with respect to its connection to the frame; *As shown in the pictures below, the T-REX Shoulder apparatus is capable of creating external rotation of the user's shoulder using the configuration of Elements 9 and 10, and note that "external rotation" of a shoulder is only one direction of rotation (opening up / pulling back to throw a ball / raising forearm to give an oath).



US 7,547,289

**Shoulder Extension Control Device**

12/13/2002

	<b>'289 Patent</b>	<b>T-REX SHOULDER</b>
<b>Claim 22:</b>	A <b>method</b> of manipulating the shoulder of a user while seated in a substantially upright position, said user having an upper arm and a forearm, said method comprising the steps of:	*The T-REX Shoulder method does manipulate the shoulder of a user that sits upright- and the user must have an upper arm and forearm.
Element 1	A) providing an apparatus itself comprising:	*The T-REX Shoulder method does use an apparatus.
Element 2	1) a frame;	*As shown in the pictures below, the T-REX Shoulder apparatus has a frame.
Element 3	2) a seat for a user to sit in such that said user can sit in said seat in said substantially upright sitting position while facing a direction substantially along a first axis, said axis being substantially horizontal;	*As shown in the pictures below, the T-REX Shoulder apparatus has a seat that causes the user to sit upright.
Element 4	3) an upper arm assembly pivotably mounted relative to said frame about a second axis, said second axis being substantially parallel to said first axis; and	*As shown in the pictures below, the T-REX Shoulder apparatus has an upper arm assembly that is rotatable about an axis that is parallel to the direction the user is facing - this axis is located substantially about the user's shoulder.
Element 5	4) a forearm assembly pivotably mounted relative to said upper arm assembly about a third axis and configured to capture the forearm of the user during manipulation of the arm of the user, said third axis being substantially orthogonal to said second axis;	*As shown in the pictures below, the T-REX Shoulder apparatus has a forearm assembly designed to capture the forearm of the user during manipulation of the user's shoulder; *As shown in the pictures below, the forearm assembly is connected to the upper arm assembly about an axis that is orthogonal to the shoulder - this axis is located about the elbow joint of the user.
Element 6	B) securing the forearm of a user to said forearm assembly;	*As shown in the pictures below, the T-REX Shoulder apparatus uses straps to hold the user's forearm to the forearm assembly.
Element 7	C) selectively discouraging relative movement of said forearm assembly with respect to said upper arm assembly while at the same time allowing said upper arm assembly and said forearm assembly to both pivot together relative to said frame about said second axis;	*As shown in the pictures below, the T-REX Shoulder apparatus is capable of keeping the forearm and upper arm assemblies locked at a single angle, which discourages relative movement about the user's elbow; *As shown in the pictures below, at the same time, the T-REX Shoulder apparatus allows the forearm and upper arm assemblies to rotate about the axis through the shoulder of the user (the elbow is locked, but the arm can rotate about the shoulder).

Element 8	D) pivoting said upper arm assembly about said second axis relative to said frame while at the same time said relative movement of said forearm assembly with respect to said upper arm assembly is discouraged such that abduction/adduction of the shoulder is created;	*As shown in the pictures below, the T-REX Shoulder apparatus provides rotation of the forearm and upper arm assemblies, and therefore the arm of the user, about the axis parallel to the direction that the user is facing- this allows abduction and adduction of the user's shoulder.
Element 9	E) selectively discouraging relative movement of said upper arm assembly with respect to said frame while at the same time allowing relative movement of said forearm assembly relative to said upper arm assembly and said frame about said third axis; and	*As shown in the pictures below, the T-REX Shoulder apparatus provides rotation of the forearm assembly while keeping the upper arm assembly locked, relative to the supporting frame; *As shown in the pictures below, the axis that the elbow is allowed to rotate is orthogonal to the elbow's axis (See Element 5).
Element 10	F) pivoting said forearm assembly about said third axis with respect to said upper arm assembly and with respect to said frame while at the same time said relative movement of said upper arm assembly with respect to said frame is discouraged such that external rotation is created at said shoulder.	*As shown in the pictures below, the T-REX Shoulder apparatus provides pivoting of the forearm assembly about an axis with respect to the upper arm assembly, and with respect to the frame while the upper arm assembly is rigid with respect to its connection to the frame; *As shown in the pictures below, the T-REX Shoulder apparatus is capable of creating external rotation of the user's shoulder using the configuration of Elements 9 and 10, and note that "external rotation" of a shoulder is only one direction of rotation (opening up / pulling back to throw a ball / raising forearm to give an oath).



## **Exhibit C**

IN THE UNITED STATES DISTRICT COURT  
FOR THE SOUTHERN DISTRICT OF FLORIDA

ERMI LLC, )  
Plaintiff, )  
vs. )  
TEAM POST OP, INC., )  
EDUARDO M. MARTI, )  
T-REX REHAB, LLC, )  
T-REX INVESTMENT, INC., and )  
ONEDIRECT HEALTH NETWORK, INC. )  
Defendants. )  
\_\_\_\_\_)  
Civil Action No. 19-CV-60851-RNS

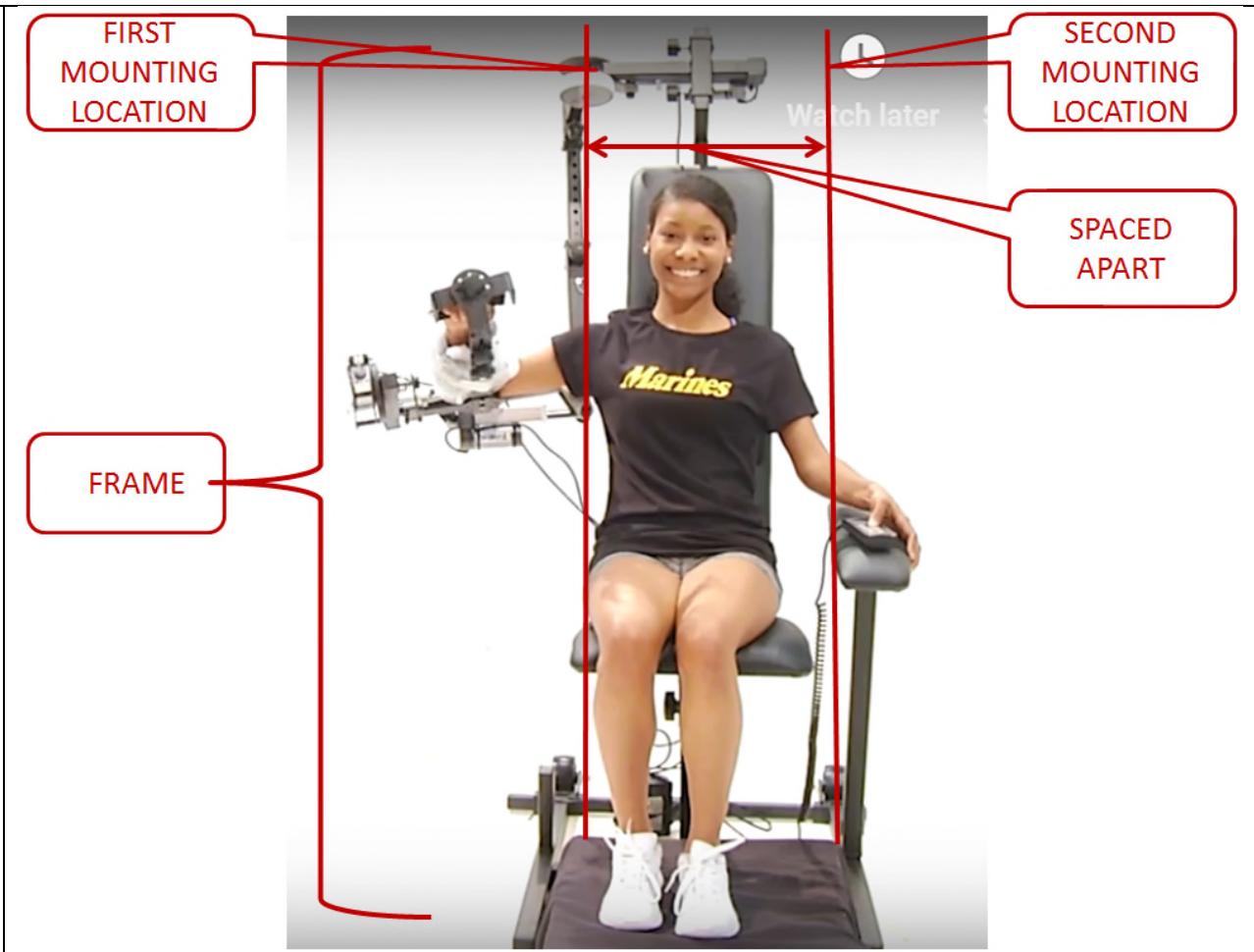
**PLAINTIFF ERMI LLC'S INITIAL CLAIM CHART RELATING THE ACCUSED  
PRODUCT TO CLAIMS OF U.S. PATENT NO. 7,547,289\***

\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

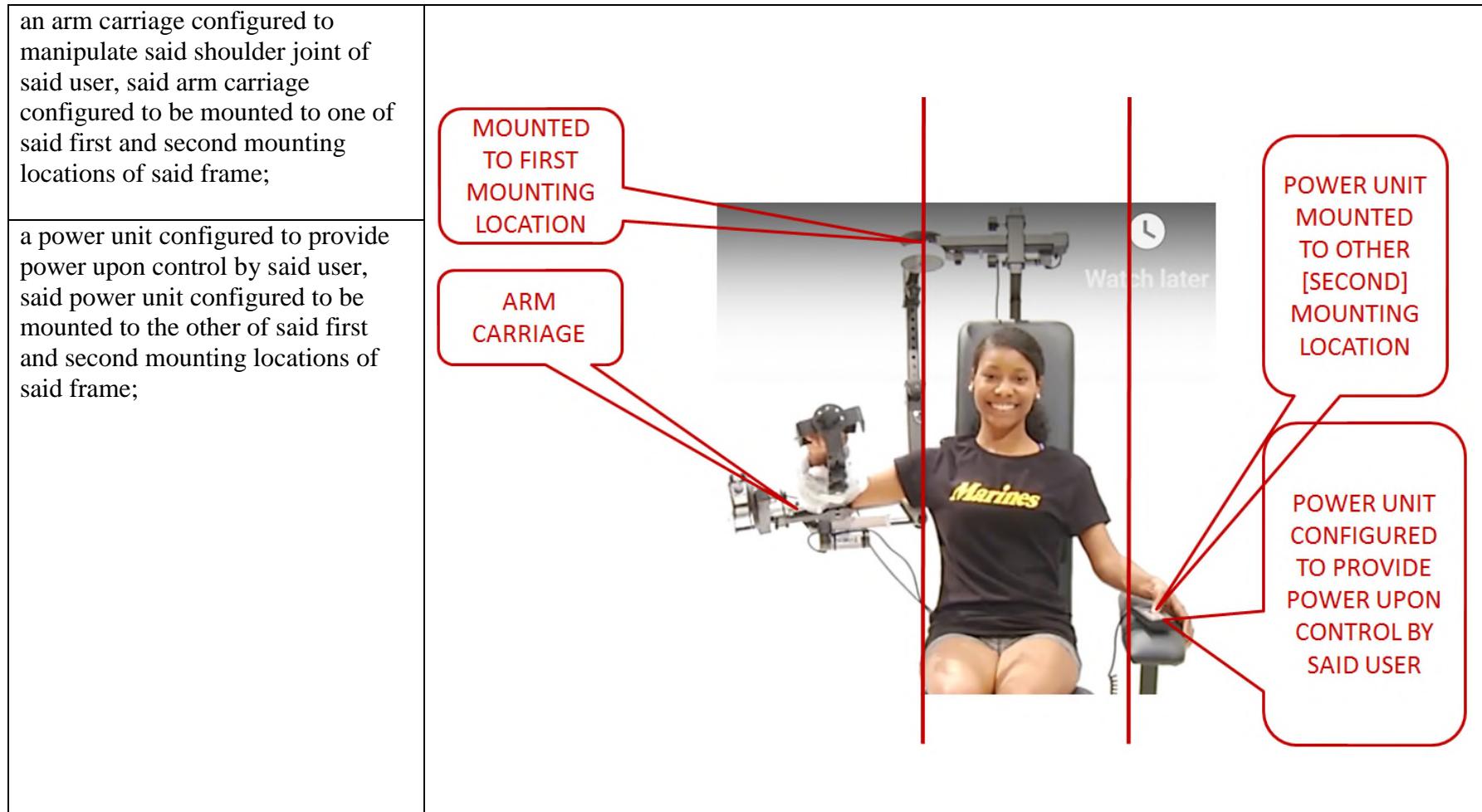
<p>Claims 1-5 are both <u>literally</u> infringed and also infringed under the <u>doctrine of equivalents</u></p>	<p style="text-align: center;"><b>Accused Device</b> [ANNOTATIONS IN RED]</p>
<p>1. An apparatus for manipulating the shoulder joint of the left or right arm of a human user, said apparatus comprising:</p>	 <p>APPARATUS</p> <p>HUMAN USER</p> <p>RIGHT SHOULDER</p> <p>LEFT SHOULDER</p>

\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

a frame including spaced apart first and second mounting locations;

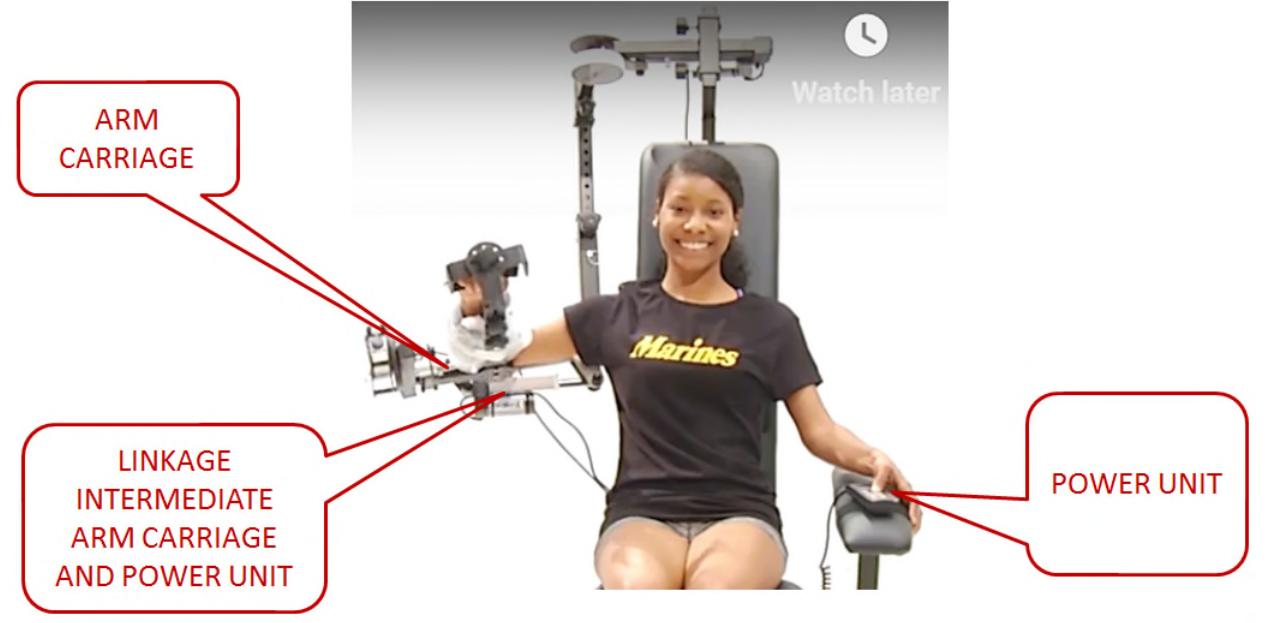


\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.



\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

a linkage intermediate said arm carriage and said power unit, said linkage configured to transfer power from said power unit to said arm carriage;



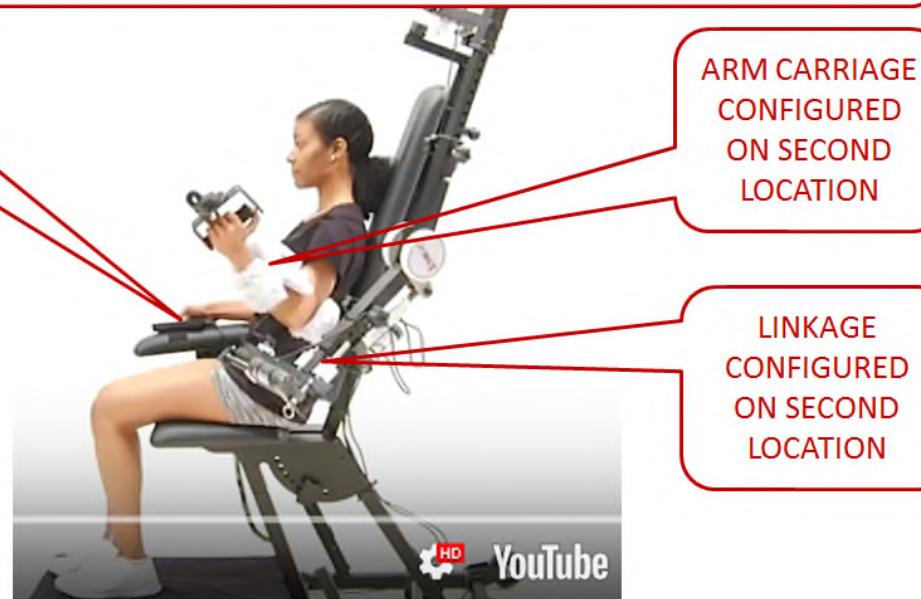
\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

said arm carriage, said power unit, and said linkage configured to allow said arm carriage and said power unit to be switched between said first and second mounting locations and operated in alternating modes, such that in a first operating mode said arm carriage can manipulate the right arm of said user, and such that in a second operating mode said arm carriage can manipulate the left arm of said user.

[Images above show arm carriage can manipulate the right arm of the user]  
[Image below shows arm carriage can manipulate the left arm of the user]

POWER UNIT  
CONFIGURED  
ON FIRST  
LOCATION

ARM CARRIAGE  
CONFIGURED  
ON SECOND  
LOCATION



\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

2. The apparatus as claimed in claim 1, wherein said carriage is configured to be adjustably mounted along either said first or second mounting locations of said frame, to allow for customizable adjustments for different users.



\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

<p>3. The apparatus as claimed in claim 2, further comprising a seat to allow said user to be seated during said shoulder joint manipulation.</p>	 <p>A seat to allow said user to be seated during shoulder joint manipulation</p>
<p>4. The apparatus as claimed in claim 1, wherein said frame is operably attached relative to a supporting seat structure, and wherein said frame is adjustable to allow for customizable positioning for said user.</p>	

\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

	 <p>A woman is seated on a black, adjustable fitness machine. The machine has a vertical frame with various mechanical components and a seat that appears to be height-adjustable. A YouTube logo is visible in the bottom right corner of the image.</p> <p>Said frame is operably attached relative to a supporting seat structure</p> <p>Said frame is adjustable to allow for customizable positioning for said user</p>
5. The apparatus as claimed in claim 4, wherein said supporting seat structure is provided by a conventional folding chair.	

\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

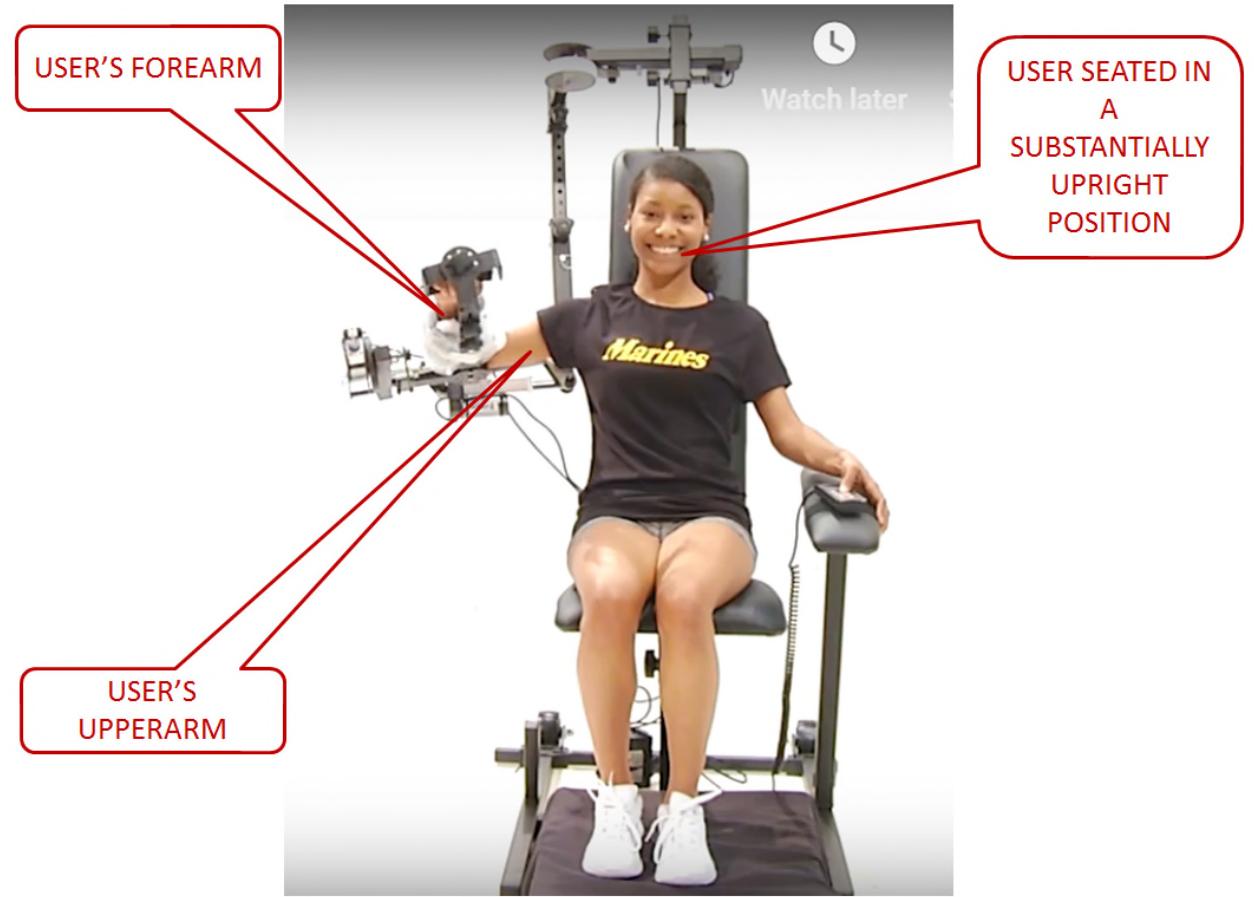


SUPPORTING SEAT STRUCTURE IS  
PROVIDED BY A CONVENTIONAL  
FOLDING CHAIR

\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

Claim 22 is literally infringed:

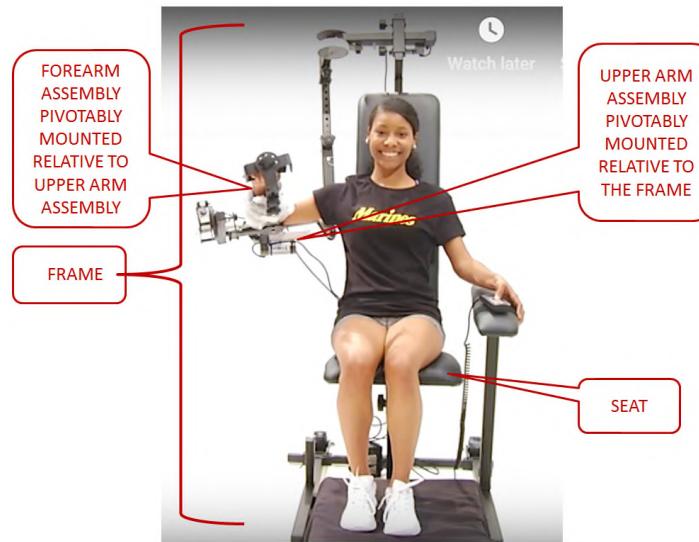
22. A method of manipulating the shoulder of a user while seated in a substantially upright position, said user having an upper arm and a forearm, said method comprising the steps of:



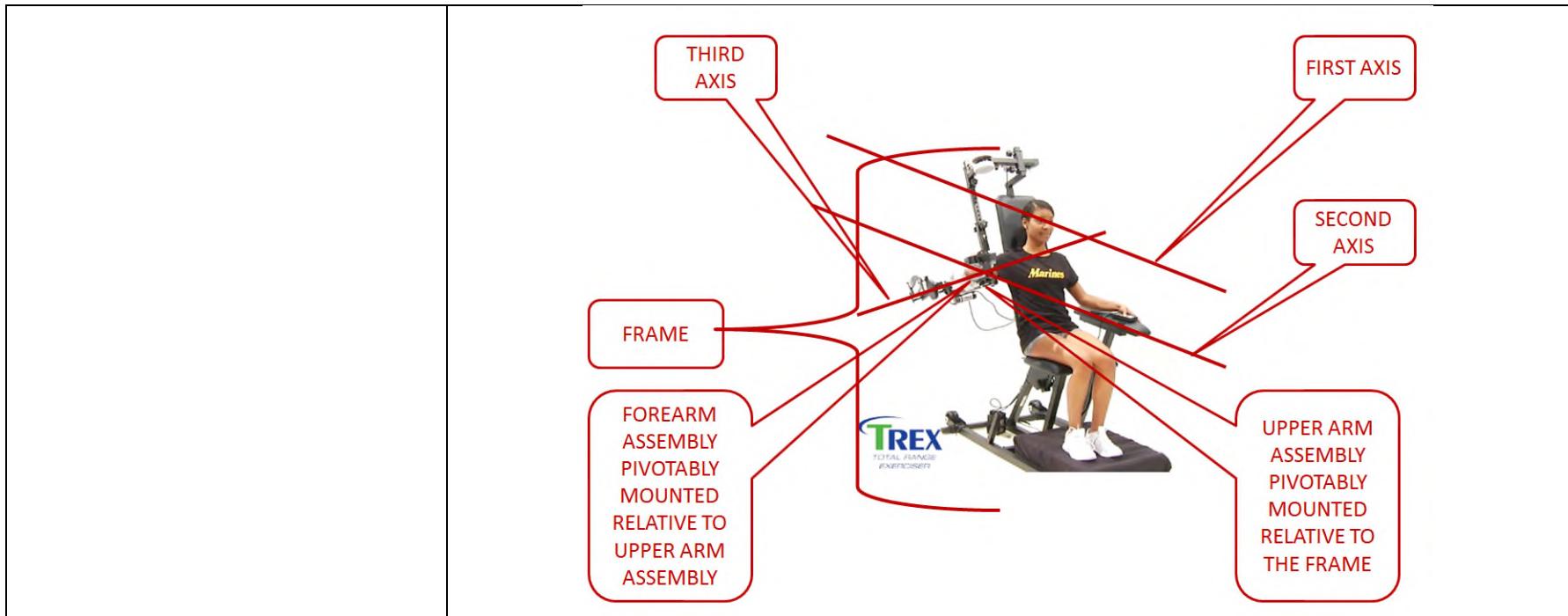
\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

A) providing an apparatus itself comprising:

- 1) a frame;
- 2) a seat for a user to sit in such that said user can sit in said seat in said substantially upright sitting position while facing a direction substantially along a first axis, said axis being substantially horizontal;
- 3) an upper arm assembly pivotably mounted relative to said frame about a second axis, said second axis being substantially parallel to said first axis; and
- 4) a forearm assembly pivotably mounted relative to said upper arm assembly about a third axis and configured to capture the forearm of the user during manipulation of the arm of the user, said third axis being substantially orthogonal to said second axis;



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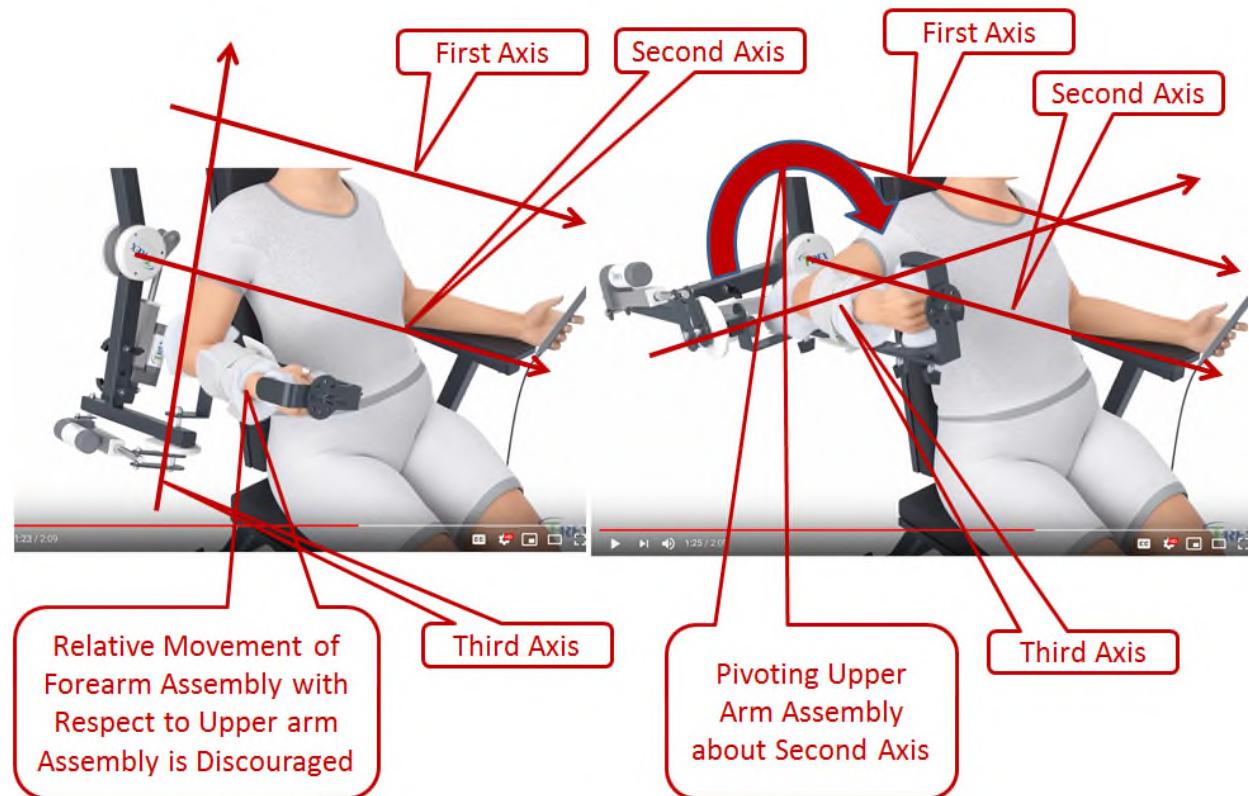
\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.



\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

C) selectively discouraging relative movement of said forearm assembly with respect to said upper arm assembly while at the same time allowing said upper arm assembly and said forearm assembly to both pivot together relative to said frame about said second axis;

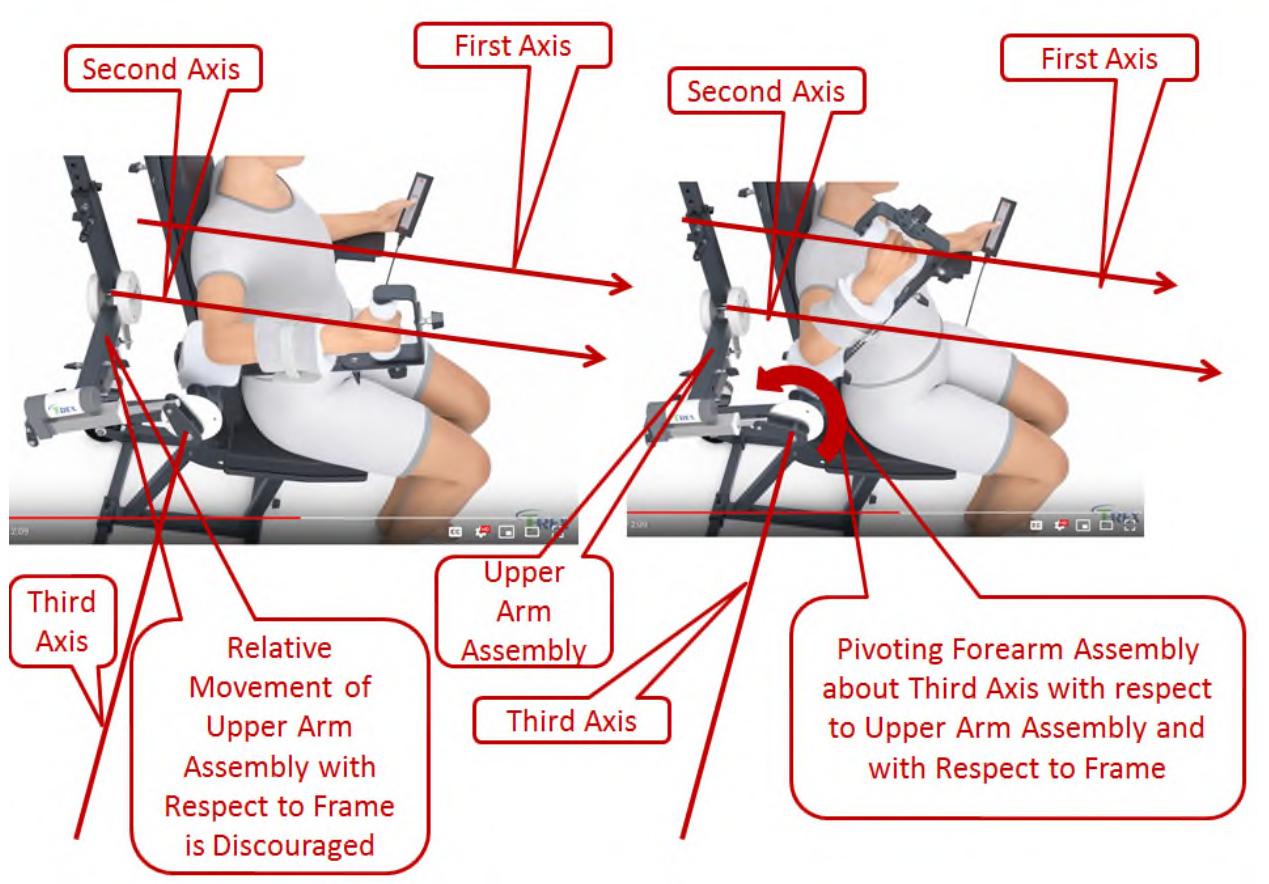
D) pivoting said upper arm assembly about said second axis relative to said frame while at the same time said relative movement of said forearm assembly with respect to said upper arm assembly is discouraged such that abduction/adduction of the shoulder is created;



\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

E) selectively discouraging relative movement of said upper arm assembly with respect to said frame while at the same time allowing relative movement of said forearm assembly relative to said upper arm assembly and said frame about said third axis; and

F) pivoting said forearm assembly about said third axis with respect to said upper arm assembly and with respect to said frame while at the same time said relative movement of said upper arm assembly with respect to said frame is discouraged such that external rotation is created at said shoulder.



\*ERMI expressly reserves the right to supplement and amend this chart after receipt of an accused device.

This the 9th day of July, 2019.

/s/ Samuel A. Long, Jr.

Samuel Alexander Long, Jr. (Pro Hac Vice)

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*Attorneys for Plaintiff ERMI LLC*

## CERTIFICATE OF SERVICE

I hereby certify that on July 9, 2019, I caused the foregoing document to be served on Defendants via electronic mail to the following counsel of record:

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/s/ Samuel A. Long, Jr.  
Samuel A. Long, Jr.

## **Exhibit D**



One West Las Olas Boulevard, Suite 500  
Fort Lauderdale, Florida 33301

Telephone: 954.525.4100  
Facsimile: 954.525.4300

March 18, 2016

Mr. John L. Raineri  
17638 SW 28<sup>th</sup> Court  
Miramar, Florida 33029

**Re: T-Rex Rehab, LLC**

Dear Mr. Raineri:

T-REX Rehab LLC has retained our firm to represent it and its principals as it pertains to any and all actions that can be pursued against you personally. As you should be aware, making false statements about another company and/or its principals with the intent to defame subjects you to civil liability for a defamation action.

Moreover, such defamatory statements are considered to be "unfair methods of competition". According to my client, you have been making defamatory statements which include but are not limited to statements such as "don't you know that there is a lawsuit against T-REX because the patient was injured using T-REX." These statements are untrue and are being made for the purpose of defaming and otherwise attempting to give T-REX a bad name.

This will be notice to you that you must retract these statements to all individuals you spoke with regarding this matter. We will give you 7 days from the date of this letter to comply. Our client will follow up with those individuals to verify you have complied. Failure to comply may result in a lawsuit being filed against you personally for making such untrue statements.

Additionally, you must cease and desist from this conduct in the future. Please govern yourself accordingly.

Sincerely,

A handwritten signature in blue ink, appearing to read 'BRIAN R. KOPELOWITZ'.

BRIAN R. KOPELOWITZ  
For the Firm

cc: TRex Rehab, LLC



One West Las Olas Boulevard, Suite 500  
Fort Lauderdale, Florida 33301

Telephone: 954.525.4100  
Facsimile: 954.525.4300

March 18, 2016

Mr. John L. Raineri  
17638 SW 28<sup>th</sup> Court  
Miramar, Florida 33029

**Re: T-Rex Rehab, LLC**

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Moreover, such defamatory statements are considered to be "unfair methods of competition". According to my client, you have been making defamatory statements which include but are not limited to statements such as "don't you know that there is a lawsuit against T-REX because the patient was injured using T-REX." These statements are untrue and are being made for the purpose of defaming and otherwise attempting to give T-REX a bad name.

This will be notice to you that you must retract these statements to all individuals you spoke with regarding this matter. We will give you 7 days from the date of this letter to comply. Our client will follow up with those individuals to verify you have complied. Failure to comply may result in a lawsuit being filed against you personally for making such untrue statements.

Additionally, you must cease and desist from this conduct in the future. Please govern yourself accordingly.

Sincerely,

A handwritten signature in blue ink, appearing to read 'BRIAN R. KOPELOWITZ'.

BRIAN R. KOPELOWITZ  
For the Firm

cc: TRex Rehab, LLC